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PESTICIDES ABSTRACTS (formerly Health Aspects of Pesticides Abstract Bulletin) is a monthly publication of the Technical Services Division of the Office of Pesticide Programs, Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides as defined in the Table of Contents. The publication represents a monthly review of more than 2,000 primary and secondary sources. A list of periodicals from which articles have been abstracted appears annually in the January issue. Subjects and authors of abstracted articles are cross-referenced in quarterly and annual indexes. Reprint requests should be directed to the author of the complete article.

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78-0460. Kozma-Kovacs, E. ; Gabor-Heckenast, N. (Cent. Food Res. Inst., Budapest, Hungary) **Survey of the literature on the testing of organophosphorus pesticides which might occur in foodstuffs** *Acta Aliment.* 6(3): 295; 1977.

Literature dealing with pesticides was categorized by mechanism of action, chemical structure, and analytical methods. Published data indicate that organophosphorus pesticides are the most widely used compounds for plant protection. Research and control stations in Hungary dealing with testing of pesticides residues were surveyed. The results indicated that pesticides research and control in Hungary employ several hundred scientists and include determination of residues in agricultural products, the study of metabolites, development of new analytical methods, and environmental protection investigations. The results of research could be utilized more efficiently if cooperation and exchange of information between research stations were better organized.

78-0461. Spynu, E. I. ; Ivanova, L. N. (All-Union Sci. Res. Inst. Hyg. and Toxicol. of Pesticides, Polymers and Plastic Materials, USSR Ministry of Public Health, Kiev, USSR) **Kiberneticheskii aspekt problemy preduprezhdeniia zagriazneniia okruzhaiushchei sredy pestitsidami. [Cybernetic aspects of the prevention of environmental pollution by pesticides.]** *Gig. Sanit.* 9: 14-16; 1977. (9 references) (Russian)

General problems of the mathematical modeling of the pesticide-environment system are discussed. The system is characterized by such phenomena as delay, cumulative effect, and threshold. The control of this system residues in the creation of conditions under which the pesticide input into the human body by various routes does not exceed the hygienic standards. The system should be subdivided into the subsystems pesticide-plant, pesticide-water, pesticide-air, and pesticide-soil. With a knowledge of the physicochemical properties and the conditions for application of the pesticides as well as of the environmental conditions and existing hygienic standards it is possible to predict the changes in pesticide residue levels in the different media of the environment.

78-0462. Tuske, M. (Novenyvedelmi Kutato Intezet, Budapest, Hungary) **A peszticid-kutatas ujabb iranyzatai. [Recent trends in pesticide research.]** *Magy. Kem. Lapja* 32(4): 190-193; 1977. (39 references) (Hungarian)

Recent trends in worldwide pesticide research include the development of new formulations for conventional pesticides, such as emulsifiable and water-soluble concentrates and ultra low volume formulations, and the development of new, selective preparations with environmentally favorable properties. Pesticide research is based increasingly on data on the chemoregulation of physiological processes. Novel pesticides include growth regulators, hormones and hormone antagonists, and chemosterilants. Chemosterilants are not expected to assume any major importance in pest control, because most of them are mutagenic.

78-0463. Anonymous. **[Nihon Kagaku Co. completely stopped the production of technical leptophos.]** *Noyaku Bijinesu (Pestic. Business)* 7(313): 2553; 1977. (Japanese)

Leptophos (phosvel) emulsion and powder was introduced as an effective insecticide against rice stem borer but was not widely popularized in Japan. The production of technical material in Japan was 496 in 1974 at its peak. Due to the problem of possible nerve disturbance sales were greatly reduced, in the USA and Japan and production amounted to only 159 in 1975. The Fukushima Prefectural Office gave notice of interest to suspend production offer 1977 following the announcement of its neurotoxicity by Fukushima Pref. Med. College. The application of the Japanese (Nihon Kagaku Co) stopping the production was recently accepted by the Pref. Office.

78-0464. Thiault, J. (C.E.T.G.R.E.F., Ministere de l'Agriculture, Aix-en-Provence, France) **La production fruitieres de la Vallee du Rhone et de la zone Mediterraneenne francaise. [Fruit growing in the Rhone Valley of the French Mediterranean.]** *Trav. Soc. Pharm. Montpellier* 37(1): 33-41; 1977. (French)

Fruit growing and the related ecological and hygienic problems in the Rhone Valley and the French Mediterranean are discussed. The hygienic standards imposed on pesticide residues in fruit and the price increase of pesticides have led to a gradual reduction in the number of pesticide treatments and in the number of active agents used in orchards, as well as to renewed interest in scientifically substantiated, integrated pest control.

78-0465. Cousserans, M. (E.I.D., Montpellier, France) **Le probleme de la demoustication. [Mosquito control problems.]** *Trav. Soc. Pharm. Montpellier* 37(1): 45-53; 1977. (French)

The current status and problems of mosquito control in France are outlined. The goal of mosquito control is the establishment of a reasonable equilibrium between man and mosquito, and not the total eradication of the latter. Therefore, global pesticide treatment has given way to larvicide application in specific areas in accordance with ecological and physiological data. Highly persistent DDT and BHC have been replaced by fenitrothion, and then by abate (temephos) and dursban (chlorpyrifos). Abate should be used exclusively outside of inhabited areas in very precisely determined doses. It is degraded in about 2 days. Its acute oral LD50 is 8,600 mg/kg in the rat. Dursban, which is more stable and also much more toxic (LD50 = 155 mg/kg in the rat), should not be used on water bodies.

78-0466. Kovacs, J. ; Skwarek, T.; Sooki-Toth, A. (Inst. Chem. Food Anal., Budapest, Hungary) **Valuation of the residues of plant protecting agents occurring in certain foodstuffs on the basis of biochemical tests.** *Acta Aliment.* 6(3): 294; 1977.

Plant protecting agents account for a signifiant portion of the foreign substances in foodstuffs, and determination of the quantities present is often decisive in evaluating the quality of the foodstuffs. The amount of contamination varies greatly in various regions, and determining whether these amounts exceed permissible limits for public health has become necessary. The applicability of *in vitro* laboratory tests can be determined from results of parallel *in vivo* tests. The currently used rapid test methods are more suitable for comparing the biological activity of different substances than for determining absolute values. The test systems used so far only result in clearly observable differences when the contamination level exceeds the permissible limit, but these systems are worthwhile because of the possibility of accumulation.

78-0467. Koudela, S. ; Cieleszky, V. (Inst. Nutr., Budapest, Hungary) **Distribution of the residues of some plant protecting agents and growth regulators during the production of foodstuffs.** *Acta Aliment.* 6(3): 295-296; 1977.

Food production and preparation may reduce or increase pesticides residues. When chlomequat chloride was used to prevent lodging of wheat, the ears contained about 15 mg/kg chlormequat, the grain about 0.5 mg/kg, the husks 25 mg/kg, the bran 1.4 mg/kg, and the flour less than 0.5 mg/kg. Husked rice obtained from grain with a diquat content of 1.3 to 4.6 mg/kg contained less than 0.1 mg/kg diquat. Experiments on the stream distillation of mint indicated that increasingly more prometryne is found in the distillate as the pH of the distillation mixture is raised. Toluidine derivative levels in tomato juice were decreased 2-12% by vacuum evaporation and 25-40% by steam distillation. Washing, peeling, and grinding remove mainly contact and localized residues; heat treatment does not significantly affect residues, and the physical properties of the active ingredients prevail during steam distillation and partition between aqueous and oily phases.

78-0468. Zawadzki, B. (Inst. Vegetable Growing, Skierniewice, Poland) **Adsorption of prometryne by humic-alluvial soil and peat soil.** *Biul. Warzywniczy* 19: 253-269; 1976. (11 references)

The adsorption of prometryne in soil was investigated using peat soil from Amsterdam, light alluvial soil reclaimed from the sea in northern Holland, and peat soil from Reguly, Poland. Dried, screened soil was mixed with distilled water in a ratio of 50 g soil per liter of water. Prometryne was added in amounts of 0.5, 5.0, 25.0, and 50.0 ppm. Concentrations of 0.0625, 0.125, 0.25, 0.5, 1.0, and 2.0 ppm were used with soil from Reguly. After incubation, the mixtures were filtered and the extracts tested for prometryne content. The soils were then dried and mixed with water that did not contain herbicide to investigate desorption. To compare prometryne adsorption by peat soil and activated carbon, peat soil and activated carbon were mixed with 1 ppm aqueous solutions of prometryne, and the mixtures were then filtered. More prometryne remained in the extract when mineral soil from Northern Holland was used, indicating that peat soil from Amsterdam adsorbed more prometryne. The alluvial soil adsorbed about 50% of the prometryne, and the peat soils adsorbed over 75% of the applied prometryne. The percentage of prometryne adsorbed was higher when the initial concentration was higher. In desorption experiments, the percentage of the initial amount of herbicide desorbed declined with increasing initial concentration. Activated carbon adsorbed more prometryne than an equal amount of peat soil from Ruguly.

78-0469. Sims, G. G. ; Campbell, J. R.; Zemlyak, F.; Graham, J. M. (Environ. Can. Fish. Mar. Serv., Technol. Branch, Box 429, Halifax, N.S. Canada B3J 2R3) **Organochlorine residues in fish and fishery products from the Northwest Atlantic.** *Bull. Environ. Contam. Toxicol.* 18(6): 697-705; 1977. (6 references)

The concentrations of PCBs and DDT (*p,p'*-DDT and its metabolites) in fish collected at various locations off the Atlantic coast of Canada during 1971 and 1972 were determined using electron capture gas chromatography. Analysis of 261 samples representing 29 species of crustacea, bivalves, and finfish showed widespread distribution of these contaminants with preferential accumulation in lipid-rich specimens. Only fatty specimens of pelagic finfish consistently contained more than 0.1 μg/g of PCB and DDT, and bluefin tuna was the only species which contained residues frequently exceeding 1 μg/g. No appreciable differences in residue levels were observed in specimens taken in different years or in specimens taken at different locations. A total of 83 samples representing 7 selected tissues and fishery products were also analyzed for PCB and DDT. The tendency for the lipid-rich tissues to accumulate these residues was again demonstrated, and the processed materials all contained lower residues than would be suggested by the residues in their raw materials. One hundred four samples were analyzed for residues of lindane, aldrin, heptachlor, heptachlor epoxide, methoxychlor, dieldrin, and hexachlorobenzene. Very low levels of the latter two and no residues of the other five were found.

78-0470. Carman, G. E. ; Iwata, Y.; Gunther, F. A. (Dep. Entomol., Univ. Calif., Riverside, CA 92502) **Pesticide deposition on citrus orchard soil resulting from spray drift and runoff.** *Bull. Environ. Contam. Toxicol.* 18(6): 706-710; 1977. (3 references)

In a model pesticide delivery experiments, mature naval orange trees were sprayed with water using oscillating boom spray equipment of the type currently in use. The gallonages of water delivered were 1,520, 1,810, 2,340, 3,000, and 3,650 gal/A, each tree receiving each gallonage at some time during the test. The target tree was sprayed twice from

each side, only directly and once from one row away. Widemouth Mason jars placed at left intervals beneath each tree were used to collect any spray reaching the orchard floor. The soil surface inside the canopy of the tree received the greatest portion of the runoff. Within the periphery of the tree, the percent of the total runoff was 68, 68, 73, 71, and 73, respectively, with increasing gallonage applied. Relatively less spray fell on the soil between the trees. Runoff increased with increasing gallonage applied as a result of additional retention of water following more thorough wetting of the tree with increased gallonage applied. Runoffs from the 1,520, 1,810, 2,340, 3,000, and 3,650 gal/A applications were 3.4, 6.0, 9.4, 13, and 16 gal/tree, respectively. These percent values were within the 25-40% range earlier approximated and can be used to roughly estimate soil pesticide burden. It is likely that in practice, however, the pesticide would be retained on the tree while water runs off. The results should not be extrapolated to noncitrus tree crops.

78-0471. Elliott, D. L. ; Iwata, Y.; Carman, G. E.; Gunther, F. A. (Dep. Entomol., Univ. Calif., Riverside, CA 92502) **Post-application slough-off of pesticide deposits on orange trees.** *Bull. Environ. Contam. Toxicol.* 18(6): 711-718; 1977. (14 references)

Valencia orange trees were sprayed at a rate of 12.5 lb a.i./2,000 gal/A with one of three formulations of parathion: wettable powder (25WP), emulsifiable concentrate (4EC), or 2 lb/gal encapsulated (Penncap E) formulation. A low-volume spray of the 25WP was also applied at 100 gal/A. Determinations were made of the magnitude and distribution of sloughed residues over the orchard floor and of dislodgable foliar parathion and paraoxon levels. The most slough-off was obtained with the encapsulated formulation and the least slough-off was obtained with the EC formulation. The naturally dislodged material was predominantly deposited within the tree canopy, relatively little being deposited between trees. Paraoxon was not detected in the slough-off, and only very low quantities of parathion were collected. The major initial loss of parathion appeared to be due to a process other than sloughing of foliar dislodgable residues, and soil residues appear to principally result from spray drift and runoff during pesticide application. Dislodgable paraoxon levels increased over a 2-3-day period, then remained constant. Dislodgable parathion residues dissipated faster after application of the EC formulation than after the WP formulation.

78-0472. Rouchaud, J. P. ; Decallonne, J. R.; Meyer, J. A. (Univ. Catholique Louvain, Lab. Phytopathol., 3, Place Croix du Sud, 1348 Louvain-la-Neuve, Belgium) **Residues of triforine and its metabolites in barley grain and straw.** *Bull. Environ. Contam. Toxicol.* 18(6): 742-748; 1977. (5 references)

Residues of triforine and its metabolites in barley grown in the field and treated with the pesticide at commercial rates were determined. Analysis was by combined preparative thin-layer chromatography (PTLC) and gas-lqiuid chromatography (GLC). In barley grown in the field, the percentages (usually greater than 75%) of unidentified metabolites bound to the solid residue were higher than those observed under laboratory conditions. These were conjugated metabolites which were insoluble in chloroform and contained the piperazine ring. Triforine corresponded to more than 90% of the foreign compounds in the secondary chloroform extract. Neither free piperazine nor unidentified metabolites soluble in the 0.1 N HCl extract were observed. The concentrations of triforine and its metabolites were usually more than twice as high in the barley straw as in the grain, and treatment with greater amounts of pesticide usually resulted in increased residue levels of metabolites. Besides the triforine residues, there were low but significant concentrations of metabolites which generally corresponded to more than 85% of the total triforine residue in both grain and straw. The apparent absence of piperazine in the barley grown in the field was probably due to the analytical limit of sensitivity for this compound.

78-0473. Gozzo, F. (Centro Ricerche Antiparassitari, Montedison SpA, Milan, Italy) **Problemi incontrati nelle fasi di ricerca e sviluppo di una famiglia di erbicidi: i carbamoilsolfossidi. [Problems encountered during research and development of a family of herbicides, the carbamoylsulfoxides.]** *Chim. Ind.* 59(6): 432-437; 1977. (10 references) (Italian)

Relationships between the structure and stability of carbamoylsulfoxides were studied. The hydrolysis of these compounds was found to increase with increasing pH. The hydrolytic degradation at acid pH was also increased by the substitution of a primary alkyl group on the sulfur atom by a secondary alkyl group, but the opposite effect was seen under alkaline pH. The elimination of these compounds from soils with an organic matter content of about 2% and with different pH values was slower than could be expected from their rates of hydrolysis. Their half-lives ranged from 2 to 5 weeks, regardless of the soil pH.

78-0474. Muir, D. C. G. (McGill Univ. Montreal, P. Q., Canada) **The determination of triazine herbicides and their degradation products in soils and water from Quebec agricultural regions.** *Diss. Abstr. Int. B* 38(7): 3164: 1978.

The triazine herbicides atrazine, cyprazine, cyanazine and metribuzin were applied to tile-drained corn fields during a three year period. Soil and water samples were collected at regular intervals after herbicide application, and the residue levels of the triazine herbicides and their volatile degradation products in the sample extracts were determined by gas chromatography. Hydroxy-*s*- triazines (hydroxyatrazine, *N*-deethylated hydroxyatrazine, cyanazine IV and hydroxxycyprazine) were found in soil at relatively high levels (50-500 μg/kg) and were more persistent than the chloro-*s*- triazine residues. Analyses of tile-drain water samples showed that several degradation products (cyanazine II and N-deethylated atrazine) were present at levels (0.01-7.00 μg/l) which were similar to those of the parent compounds. Analyses of water samples from five rivers in the Yamaska river basin in Quebec (1974-1975) showed that atrazine and *N*

-deethylated atrazine were the major pesticide residues (0.01-26.9 μg/l) in the river water. It was estimated that from 0.1 to 2.9% of the atrazine that was applied within each watershed may have found its way into the river system. (Author abstract by permission, abridged).

78-0475. Simonffy, Z.; Horvath-Janeso, E.; Vida-Poroszlay, B. (Author address not given) **Allati eradetu elolmiszerekben elefordulo szermaradvanyok mennyisegi valtozasai. [Quantitative changes of residues of agents in foods of animal origin.]** *Elelmiszervizsgalati Kozl.* 23(3): 80-88; 1977. (15 references) (Hungarian)

A study was made in 1976 of the residues of chlorinated hydrocarbons (total DDT and total HCH) in 793 samples of foods of animal origin. Most of the DDT was found in cattle and pig fat tissues and also in fatty tissues of non-domesticated animals. The amount of HCH and its isomers was insignificant remaining below the limit value throughout the study. In comparing these results with those obtained in the years between 1971 and 1976, it was found that the levels of DDT had been steadily decreasing during that period, with the largest decrease occurring in the year 1976. Results for organic phosphoric acid esters showed negative findings in 209 samples studied during 1976. Trace elements such as zinc, copper, lead, arsenic and mercury were sought in 401 samples. Contents exceeding the Hungarian limit values were found only in the case of zinc, but even in that case they corresponded to international data. Negative results were reported for studies looking for antibiotics such as Zn-bacitracin, OTC, penicillin, flavomycin. Hormone effects were studied in 74 samples, and in no case were the findings objectionable.

78-0476. Gladen, B. ; Rogan, W. (Biometry Br., NIEHS, Research Triangle Park, NC 27709) **Environmental contaminants of foods for infants.** *Environ. Health Perspect.* 20: 248; 1977.

A number of very stable man-made compounds, including DDT and polychlorinated biphenyls (PCBs), are ubiquitous in the environment. They tend to be stored in fat in humans, and excretion is slow. Breast milk contains about 3% fat, more than any other substance excreted by humans, and studies have found PCB and DDT in a very high proportion of breast milk samples. Cow's milk and formula for feeding infants are regulated and do not show this contamination. A study has been begun in North Carolina to determine whether health effects known to result from exposure to these compounds can be seen in infants and to establish a cohort of children on whom exposure is well known so that a long term study would eventually be possible. Mothers giving birth in three or four hospitals will answer a questionnaire and give samples of blood and breast milk or colostrum, and infants will be examined and samples of cord blood and placenta collected. Follow up examinations 6 weeks, 3 months, and 6 months later will involve a brief questionnaire, an examination of the child, and collection of breast milk or formula.

78-0477. Kampe, W. (Landwirtschaftl. Unters. Forschungsanst. Speyer, 6720 Speyer, Germany) **Agrochemikalien - Gafahr fur Umwelt und Nahrung! Teil II: Probleme des Einsatzes von Siedlungsabfallkomposten und Pflanzenschutzmitteln sowie Ausblick. [Agrochemicals, a threat to food supplies and the environment. Part 2. Problems of the use of municipal refuse composts and pesticides -- prospects.]** *Forum Hygiene* (5): 145-149; 1977. (8 references) (German)

General hygienic problems of municipal refuse composts and agricultural pesticides are discussed. Acute poisoning with pesticides is a minor problem compared to that with other chemicals, while some pesticides, especially organochlorine preparations, are environmentally hazardous due to their persistence and accumulation in soil, water, and food. The residue tolerances for foods have been established with a safety factor of 100 or higher. Systematic residue analyses in food over several years revealed no detectable residues in 80% of the samples, and residue levels in excess of the tolerance limit were found in 2% only. The pesticides found in such high concentrations were organochlorine preparations almost without exception. Herbicides were found in foods of vegetable origin in very low concentrations if at all. Seventy-two per cent of the samples with pesticide residues contained only one substance, 21% contained two, 5% contained three, and more than three pesticides were found in only 1%. The pesticide residues were below the allowable limit in all 150 samples analyzed in 1976. The findings indicate that pesticide residues in food represent no major hygienic problem in West Germany.

78-0478. Bel'nov, A. V. (Tbilisi Oblast Sanitary Epidemiological Station, Tbilisi, USSR) **Nekotorye rezul'taty laboratornogo kontrolia DDT i geksakhlorana v pishchevykh produktakh. [Certain results of laboratory control for prevention of DDT and hexachlorane accumulation in food products.]** *Gig. Sanit.* (4): 97; 1975. (Russian)

Eleven thousand eighty-two samples of food products collected in the Tambov Oblast during 1967-1973 were analyzed for DDT and hexachlorane (BHC) residues by thin-layer chromatography. The residue levels ranged from traces to several mg per kg. While DDT was found mainly in food products of vegetable origin (in 12.5% of all samples), hexachlorane was found mainly in foods of animal origin (in 10.9% of all samples). The DDT and hexachlorane residues found in samples of animal origin were mainly due to the treatment of the animals (cattle, poultry) with these preparations.

78-0479. Vrochinskii, K. K. ; Makovskii, V. N.; Stefanskii, K. S. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pestic., Polymers,Plastic Materials, Kiev, USSR) **Nekotorye gigienicheskie aspekty migratsii pestitsidov v biosfere. [Hygienic aspects of pesticide migration in the biosphere.]** *Gig. Sanit.* (9): 66-70; 1977. (16 references) (Russian)

Studies on the migration of pesticides in the biosphere are reviewed. The ability of certain pesticides to migrate in water was found to decrease in the order DDT, poly-

chloropinene (strobane), melprex (dodine), phosalone, lindane, and phthalophos (phosmet). the migration of DDT from the soil into plants is highest for root crops, such as carrots and potatoes (4-25%), and lowest for corn (2%) and cabbage (0.3-0.6%), and increases with the DDT level in the soil. Carbaryl was found to persist for 1-2 years in soil and for 0.5-3 months in plants grown in soil containing carbaryl.

78-0480. Likhtarev, I. A. ; Ushakova, A. P.; Moiseev, A. A. (Leningrad Scientific Research Institute of Radiation Hygiene, Leningrad, USSR) **K otsenke populiationnoi dozy i otnositel'noi veroiatnosti otdalennykh posledeistvii primeneniia pestitsidov v sel'shom khoziaistve. [Assessment of the population dose and relative probability of late consequences of the use of pesticides in agriculture.]** *Gig. Sanit.* (9): 81-87; 1977. (7 references) (Russian)

A complex mathematical model was developed to describe the migration of pesticides in the environment and their accumulation in the human body, and to predict the possible stochastic somatic and genetic effects that may be produced by the use of pesticides in agriculture on the long run. The model is based on the cumulative pesticide dose in the population, which is determined by means of such factors as the actual pesticide levels in food, air, and water, the composition of the diet, the ability of different pesticide residues to accumulate in foods and in organs, the length of exposure to pesticide residues, and the ability of the specific pesticides to cause toxic, genetic, or neoplastic changes in specific organs.

78-0481. Tvalchrelidze, E. V. ; Tortladze, Ts. M. (Author address not given) **Nekotorye dannye o zagriaznenii pochv i-rastenii gamma-izomerom GKhTsG v rezul'tate primeneniia preparata PLK. [Information on contamination of soil by lindane after use of PLK preparation.]** *Gig. Sanit.* (9): 100-101; 1077. (Russian)

The migration and persistence of lindane in needles, soil, grass, and mushrooms growing under treated coniferous trees were studied during a 3-year period following the treatment of trees with PLK mixture, containing 5.5% lindane as active agent. Lindane was found in the soil in a 0.5-1 m radius around the trunks of the treated trees, and in the bark and needles 2-3 months after treatment. The residue levels found in the soil, bark, and needles 1 year after treatment were 9-56 times lower than initial levels. Lindane was found only in the upper 20-30 cm soil layer. No residues were found in grass and mushrooms growing under the trees 1 year after the treatment. The horizontal and vertical migration of lindane was negligible.

78-0482. Kadoum, A. M. ; Mock, D. E. (Assoc. Res. Entomol. Pestic. Chem.) Kansas Agric. Exp. Stn., Manhattan, KS 66506) **Herbicide and insecticide residues in tailwater pits: water and pit bottom soil from irrigated corn and sorghum fields.** *J. Agric. Food Chem.* 26(1): 45-50; 1978. (9 references)

Water and soil sediment samples from tailwater pits used to collect irrigation runoff were analyzed for herbicide and insecticide residue. Herbicide residues were more frequently found and generally more persistent than were insecticide residues. Atrazine residue occurred more frequently than other pesticides in both pit bottom soil and water samples. Propazine and fonofos residues were also common. The maximum amount of atrazine detected was 1068.3 ppb in botton soil and 1074.1 ppb in water. Propazine also was detected at a high level, 429.0 ppb in bottom soil and 153 ppb in water. Insectidies such as fonofos were found at 771.2 ppb in bottom soil and 5.9 ppb in water. Analyses detected residues of 11 additional pesticides: alachlor, carbofuran, cyanazine, dimethoate, disulfoton, EPN, EPTC, parathion, phorate, R25788, and terbutryn. In general, pesticide residues were small enough that water from irrigation tailwater pits could be reused to irrigate crops in the same or other fields. In a few cases, however, herbicide residues were concentrated sufficiently that particularly sensitive crops might be damaged if irrigated with water from the pits. Insecticide residues were usually not detected at the end of the growing season. Residues of fonofos were sufficient in five pits (1974) to kill fish if the pit bottom soil had been roiled and to be a potential hazard to birds and mammals. (Author abstract reprinted by permission of the American Chemical Society)

78-0483. Ambrosi, D. ; Isensee, A. R.; Macchia, J. A. (Centre Nicolas Grillet, Societe Rhone-Poulenc, 94400 Vitry/Seine, France) **Distribution of oxadiazon and phosalone in an aquatic model ecosystem.** *J. Agric. Food Chem.* 26(1): 50-53; 1978. (6 references)

Four species of aquatic organisms were exposed to the herbicide oxadiazon [2-*tert*-butyl -4- (2,4-dichloro -5- isopropoxyphenyl)-Δ^2-1,3,4- oxadiazolin-5-one] and the organophosphate insecticide phosalone, [*O,O*-diethyl *S*-(6-chloro-2-oxobenzoxazolin-3-yl)methyl] phosphorodithioate, in a model ecosystem for 48 and 31 days, respectively. Oxadiazon was introduced into the ecosystem adsorbed to 400 g of soil at the rate of 1 and 10 ppm, whereas soil treated with 10 ppm phosalone was aged for 84 days before introduction. The organisms accumulated oxadiazon and phosalone 30 to 300 times greater than the water content, which indicates a low bioaccumulation potential. Seven degradation products of oxadiazon were found, with snails degrading oxadiazon more extensively than did algae or fish. Phosalone was toxic to daphnids and fish in the 20 to 30 ppb range, and only two degradation products were obtained. (Author abstract reprinted by permission of the American Chemical Society)

78-0484. Guzik, F. F. (PPG Ind., Inc., Chem. Div., Barberton, OH 44203) **Photolysis of isopropyl 3-chlorocarbanilate in water.** *J. Agric. Food Chem.* 26(1): 53-55; 1978. (8 references)

Photolysis of isopropyl 3-chlorocarbanilate (CIPC) in distilled water at 25°C using simulated noonday sunlight afforded isorpopyl 3-hydroxycarbanilate (3-HOIPC) as the only major photolysis product. Half-life for the disappear-

ance of CIPC under these conditions was 130 h. A second major photolysis product, 2-isopropoxycarbonylamino- 1,4-benzoquinone, was obtained when the photolysis was performed in 2% aqueous acetone. (Author abstract reprinted by permission of the American Chemical Society)

78-0485. Roberts, R. B. ; Look, M.; Haddon, W. F.; Dickerson, T. C. (Pacific Southwest For. Range Exp. Stn., For. Serv., U.S. Dep. Agric., Berkeley, CA 94701) **A new degradation product of the insecticide mexacarbate found in fresh water.** *J. Agric. Food Chem.* 26(1): 55-59; 1978. (32 references)

The carbamate insecticide mexacarbate (4-dimethylamino- 3,5-xylyl methylcarbamate) is degraded in plants and animals by oxidation of the dimethylamino group and by hydrolysis of the carbamate moiety. In water solutions of different pH values, essentially the same degradation products were found: 4-methylamino- 3,5-xylyl methylcarbamate, 4-amino- 3,5-xylyl methylcarbamate, 4-methylformamido- 3,5-xylyl methylcarbamate, 4-formamido- 3,5-xylyl methylcarbamate, 4-dimethylamino-3,5-xylyl hydroxymethylcarbamate. Additional products identified included 4-dimethylaminoxylene and 2-hydroxy-3,5-dimethyl- *p*-benzoquinone, a new degradation product. Bioassay of this new degradation product on sixth stage western spruce budworm (*Choristoneura occidentalis* Freeman) larvae indicated little or no toxicity at the rate of 0.1 mg/g body weight by topical application and 0.05 mg/g body weight by injection. (Author abstract reprinted by permission of the American Chemical Society)

78-0486. Wahid, P. A. ; Sethunathan, N. (Cent. Rice Res. Inst., Cuttack-753006, Orissa, India) **Sorption-desorption of parathion in soils** *J. Agric. Food Chem.* 26(1): 101-105; 1978. (15 references)

Sorption of parathion by soils differing widely in their physicochemical characteristics was investigated employing radiotracer technique. Organic matter was the most important single factor affecting parathion sorption in soils. The relationship between parathion sorption and organic matter content of soils was logarithmic. In soils oxidized with H_2O_2, parathion sorption was correlated with clay and free Fe oxides. Similarly, inorganic soil constituents influenced parathion sorption in soils with $<$ 2% organic matter, but their role was apparently masked by organic matter at levels above 2%. Desorption studies revealed that parathion sorption in soils high in organic matter content such as Kari and Pokkali soils of Kerala, South India, was almost irreversible. An equation was developed from the relationship between Freundlich constant, k, and soil organic matter would assist in predicting parathion sorption in soils with known organic matter content. (Author abstract reprinted by permission of the American Chemical Society)

78-0487. Chopra, N. M. ; Campbell, B. S.; Hurley, J. C. (Tob. Pestic. Res., N.C. Agric. Tech. State Univ., Greensboro, NC 27411) **Systematic studies on the breakdown of endosulfan in tobacco smokes: Isolation and identification of the degradation products from the pyrolysis of endosulfan I in a nitrogen atmosphere.** *J. Agric. Food Chem.* 26(1): 255-258; 1978. (13 references)

With the objective of studying the possible degradation products of endosulfan in endosulfan-treated tobacco smoke, endosulfan I was pyrolyzed at 880-900°C. Among the pyrolysate endosulfan I and II, endosulfan ether, hexachlorocyclopentadiene, all chlorbenzenes, methyl chloride, dichloromethane, chloroform, carbon tetrachloride, 1,1-dichloroethane, trichloroethylene, and tetrachloroethylene were identified. From the reaction mechanisms involved in the formation of these compounds it is postulated that the endosulfan degradation products, which have a mathematical chance of being present in tobacco and cigarette smokes, are: endosulfan I and II, endosulfan sulfate, endosulfan ether, endosulfan lactone, mono-, di-, tri-, and tetrachlorobenzenes, and hexachlorocyclopentadiene. (Author abstract reprinted by permission of the American Chemical Society)

78-0488. Williams, R. R.; Bidleman, T. F. (Dep. Chem., Univ. South Carolina, Columbia, SC 29208) **Toxaphene degradation in estuarine sediments.** *J. Agric. Food Chem.* 26(1): 280-282; 1978. (14 references)

Toxaphene in anoxic salt marsh sediments was degraded within a few days to compounds having gas chromatographic retention times shorter than those of standard toxaphene components. This breakdown occurred in sterile as well as unsterile sediments and also in a sand-Fe(II)/Fe(III) system. No breakdown was noticed in a sand system that did not contain the iron redox couple. (Author abstract reprinted by permission of the American Chemical Society)

78-0489. Lane, L. G. ; Ammerman, G. R.; Lane, R. H. (Mississippi State Univ., Chem. Lab., Mississippi State, MS 39762) **Influence of thermal processing and cooking methods on naturally occurring residues of DDT and its metabolites in beef.** *J. Food Sci.* 43(1): 172-189; 1978. (15 references)

Beef cattle were fed a daily ration for 216 days containing high levels of *p,p'*-DDE, *p,p'*-DDD, and *p,p'*-DDT residues. After a 56-day waiting period, two animals were slaughtered, and the total edible portion from each was ground. Total pesticide residues in the two lots of ground beef were 5.02 ppm and 8.11 ppm. Four beef patties from each lot were processed by each of four methods: canning following by Steritort processing for 342 min at 104°C, canning followed by Steritort processing for 66 min at 127°C, microwave cooking, and broiling. DDE in the fat extracted from cooked patties from the low-pesticide lot ranged from 2.13 ppm in broiled patties to 3.09 ppm in patties processes by Steritort at 127°C. DDE in fat from patties from the high-esticide lot ranged from 3.74 ppm in broiled patties to 4.92 ppm n patties processed by Steritort at 127°C. DDE levels in patties cooked by microwaves did not differ significantly from those in broiled patties. In patties from the low pesticide lot, DDD concentrations averaged 0.27 ppm in rat fat and ranged from 0.31 ppm in fat from patties cooked by mi-

crowaves to 0.94 ppm in fat from patties processed by Steritort at 104° C. Equivalent DDD concentrations in the high pesticide patties were 0.74 ppm in rat patties, 0.76 ppm in patties cooked by microwaves, and 1.36 ppm in patties processed by Steritort at 104°C. The increased DDD levels indicate dechlorination of DDT to DDD. In patties from the low pesticide lot, DDT concentrations averaged 1.54 ppm in raw fat and ranged from 0.09 ppm in fat from patties processed by Steritort at 104°C to 1.22 ppm in fat from patties cooked by microwaves. Equivalent DDT concentrations in the high pesticide patties were 1.81 ppm in raw fat, 0.10 ppm in patties processed by Steritort at 104°C, and 1.35 ppm in patties cooked by microwaves. Fat from broiled beef contained more DDT than fat from beef processed by Steritort. Total pesticide levels in fat ranged from 3.58 ppm in broiled patties to 4.15 ppm in patties processed by Steritort at 127°C for patties from the low pesticide lot and from 5.86 ppm in broiled patties to 7.10 ppm in patties processed by Steritort at 127°C for patties from the high pesticide lot.

78-0490. Zagainyi, S. A.; Ignatova, E. A.; Gur'ian, I. S. (Sci. Res. Inst. Horticult. Floricult. Mountainous Areas, USSR) **Insektitsidy protiv vostochnoi plodozhorki na persike. [Pesticides for the control of *Grapholitha molesta* Busch. in peach trees.]** *Khim. Sel'sk. Khoz.* 15(9): 56; 1977. (2 references) (Russian)

Peach trees were sprayed 3-4 times with phosalone (30%), carbaryl, phthalophos (phosmet), and trichlorfon to control *Grapholitha molesta* Busch. The application rate was 3 liters of broth per tree. The residues in peaches were determined by thin-layer chromatography. Phosalone, phthalophos and trichlorfon residues were not detectable in the fruit 10 days after spraying, at which time the carbaryl residue level was 1.2 mg/kg. Carbaryl residues were found for over 30 days; the residue level was 0.3 mg/kg on the 24th day. The findings indicate that carbaryl is not recommended for use on peach trees because of its slow degradation.

78-0491. Shestopalova, N. A. (Dnepropetrovsk Exp. Stn. Vegetable Melon Growing, Dnepropetrovsk, USSR) **Linuron i daktal na posadkakh kartofelia pri oroshenii. [Linuron and dacthal on irrigated potato fields.]** *Khim. Sel'sk. Khoz.* 15(9): 57-60; 1977. (8 references) (Russian)

The efficacy of linuron (2, 3 and 4 kg/ha) and decthal (4, 8 and 12 kg/ha) was studied in irrigated potato fields. The soil was medium-loamy chernozem with 3.6-4.2% humus and pH 6.9. Linuron (3 kg/ha) and dacthal (8 kg/ha) did not alter the culinary properties of the potatoes. Potatoes grown on fields treated with linuron (3 kg/ha) contained 1 mg/kg linuron in the skin and 0.04 mg/kg in the flesh, as compared with a maximum allowable residue level of 0.1 mg/kg.

78-0492. Klisenko, M. A. ; Kiseleva, N. I. (All-Union Sci. Res. Inst. Hyg. Toxicol., USSR) **Prevraschchenie poliklorpinena v pochve sveklovichnykh poley. [Transformation of polychloropinene in the soil of beet fields.]** *Khim. Sel'sk. Khoz.* 15(9): 68-69; 1977. (5 references) (Russian)

The degradation of polychloropinene (shobane) was studied in soil of sugar beet fields as well as the beet roots and tops by GLC. The analysis of samples taken 5-10 days after the application of polychloropinene showed practically no metabolism. A considerable increase of metabolites with reduced chlorine content, i.e., of lower toxicity, was found in samples taken 1.5-2 months after treatment. Such dechlorinated metabolites were also found in beet tops and roots. The findings indicate the gradual dechlorination and detoxication of polychloropinene and its migration into sugar beets. Dissolved ammonia and microorganisms are believed to be chiefly responsible for the detoxication of polychloropinene in the soil.

78-0493. Umarov, A. A. ; Nagrebetskaia, V. V. (Inst. Plant Chem., Uzbek SSR Acad. Sci., USSR) **Deistvie 5-KhIB i kotorana na mikrofloru serozemno-lugovoi pochvy pod khlopchatnikom. [Effect of 5-chloro- *N*-isopropenyl benzimidazolone (5-CIB) and fluometuron on gray desert and meadow soils in cotton-fields.]** *Khim. Sel'sk. Khoz.* 15(9): 66-68; 1977. (5 references) (Russian)

The effects of 5-chloro- *N*-isopropenyl benzimidazolone (5-CIB; 7.5 kg/ha) and fluometuron (2.5-3 kg/ha) on the soil microflora were studied in gray desert soil and meadow soil in cotton fields. The pesticides were applied before sowing in 2 consecutive years. In soil samples taken in June and August during the first year the pesticides did not inhibit the soil microorganims, and 5-CIB even stimulated the growth of Actinomycetes. In the spring of the second year fluometuron inhibited the growth of bacteria, fungi and Actinomycetes in the 10-28-cm soil layer due to its accumulation in this layer. No significant inhibition was found in this layer in June and August. After its application in the second year, 5-CIB had a toxic effect on fungi, after which it had no effect on the microorganisms. The findings indicate that 5-CIB did not inhibit the microorganisms participating in the mineralization processes, and was inactivated in a relatively short time (2-5 months), while fluometuron migrated into the 10-28 cm soil layer, where it inhibited certain groups of microorganisms due to its relatively slow inactivation.

78-0494. Fukushima Prefectural Office (Fukushima Prefecture, Japan) **[Water pollution by organophosphorus compounds.]** *Kogai-Hakusho (White Paper on Environmental Pollution)* 107-155; 1978. (Japanese)

Among the pollutants in water ways of Japan, organophosphorus compounds are rigorously controlled, and it has been established that these compounds must not be detected in the water system. According to the results of water quality examinations on 107 samples from rivers of Fukushima Prefecture, organophosphorus compounds were not detected from April 1976 to March 1977. Other pollutants such as cyanide, alkyl mercury, cadmium, lead, hexavalent chromium, arsenic, total mercury, and PCB, were also determined.

78-0495. Fukushima Prefectural Office (Fukushima Prefecture, Japan) **[Environmental pollution by pesticides for**

agricultural use.] *Kogai Hakusho (White Paper on Environmental Pollution)* 291-295; 1978. (Japanese)

As a part of the measures for safe use of and for preventing pollution by agricultural pesticides the amounts of residues of pesticides in foods, for which a standard for pesticide residues has been established was determined. The results were as follows: BHC was found at N.D. (not detectable) to 0.004 ppm in Chinese cabbage (6 samples), potato (6 samples), tomato (6 samples), strawberry (4 samples) and cucumber (6 samples); dieldrin and aldrin were found at N.D. to 0.016 ppm in spinach (4 samples) and cucumber (6 samples); dicofol was found at N.D. to 0.8 ppm in pear (4 samples) and apple (6 samples); fenitrothion was found at 0.005 to 0.02 ppm in grapes (2 samples). The other fruits in which fenitrothion was found were peach (4 samples from N.D. to 0.03 ppm), pear (4 samples from N.D. to 0.04 ppm) and apple (6 samples from N.D. to 0.01 ppm). However, only one sample of spinach contained dieldrin in excess of the standard. All the foods were products of Fukushima Prefecture.

78-0496. Mittelstaedt, W. ; Fuehr, F. (Arbeitsgruppe Rodioagron., Kernforschungsanlage Juelich GmbH, D-5170 Juelich, Germany) **Verhalten von Propineb in bewachsenem und unbewachsenem Boden. [The fate of propineb in planted and unplanted soils.]** *Landwirtsch. Forsch.* 30(3): 221-230; 1977. (12 references) (German)

A lysimeter study on undisturbed soil profiles investigated the fate of propineb from ^{14}C-labelled Antracol. Twenty-two months after 10 kg Antracol/ha was applied by spraying, 43% of the radioactivity was lost by uncultivated lysimeter soil and 26% by soil under perennial rye grass. Decomposition studies with the same soils under controlled moisture and temperature conditions indicated the loss was due mainly to mineralization. The top 5 cm of soil contained most of the remaining radioactivity. It was only possible to extract 10%. Strong adsorption or incorporation into organic matter in the soil apparently prevented further translocation or leaching. During a period of 22 months, 1.8% of the radioactivity leached from the soil column. Only 0.3% was leached from soil under grass. The low radioactivity in the leached Antracol prevented detection of propylene urea or propylene thiourea. Relatively high residues were found in the first two cuttings of grass taken 30 and 44 days after spraying; thin layer chromatograms indicated propylene urea to be the major metabolite. The next 5 cuttings were considerably less radioactive, equivalent to 1 to 2 ppm propineb in fresh weight.

78-0497. Cerna, V. ; Benes, V. (Inst. Hyg. Epidemiol. Prague, Czechoslovakia) **Dynamika rezidui faltanu I. Rezidua po prakticke aplikaci na skladovanou cukrovou repu. [Dynamics of faltan residues.]** *Listy Cukrov.* 93(10): 229-233; 1977. (23 references.

The dynamics of faltan (folpet) residues were investigated in sugar beets treated with smoke aerosol (8 g ai/m^3) at a sugar factory. Thin-layer chromatography and GLC methods indicated surface residues of 0.006-0.051 mg/kg on roots, subsurface residues of 0.01-0.05 mg/kg on root samples, and residues of 0.013-0.06 mg/kg in beet slices. No folpet residues were found in exhausted slices, molasses, and raw juice. Residues of 0.025-0.05 mg/l were found in samples of water from the sugar factory.

78-0498. Matthey, E. (Eidg. Gesundheitsamt, Bern, Switzerland) **Die Durchfuehrung der Lebensmittelkontrolle in der Schweiz im Jahre 1976. [Food monitoring in Switzerland in 1976.]** *Mitt. Geb. Lebensmittelunters. Hyg.* 68(3): 279-397; 1977. (German)

Results of systematic food monitoring in Switzerland in 1976 are presented. Insecticide residues were found in 188/3,682 food samples investigated in one series. Feeding dressed seed to cows caused high BHC levels in the milk in one case. In another series, the incidence of milk samples with excessively high DDT-DDE-TDE levels increased in 1976 compared with 1975 and 1974, while the percentages of samples with high lindane and BHC levels decreased. The lindane, total BHC, hexachlorobenzene, dieldrin, heptachlor epoxide, and total DDT levels in Swiss, French and Italian cheeses were below the tolerance in one series, and the percentage of excessive residue levels showed a considerable decrease from the 1973 value in another. The average DDT levels found were 0.068 in meat and 0.053 ppm in fat. High dithiocarbamate levels were found in some samples of imported lettuce. Groundwater samples analyzed contained 0.012-0.019 mg/m^3 hexachlorobenzene, 0.25 mg/m^3 methidathion, and 0.6 mg/m^3 diazinon.

78-0499. Corvi, C. ; Dallmayr, I.; Meyer, M.; Vogel, J. (Lab. Cantonal Chim., CH-1205 Geneva, Switzerland) **Les residus de brome dans les denrees alimentaires apres utilisation de bromure de methyle. [Bromine residues in foods after use of methyl bromide.]** *Mitt. Geb. Lebensmittelunters. Hyg.* 68(3): 431-439; 1977. (12 references) (French)

Various foods fumigated with methyl bromide were analyzed for bromine residues. Shelled hazelnuts contained 48 and 18 ppm of bromine 4 and 5 years after fumigation, respectively. The residue levels wer 2-36 ppm in barley, 4-70 ppm in wheat, up to 23 ppm in apples, 8-11 ppm in figs, 3 ppm in raisins, 6-101 ppm in almonds, 18-48 in cacao beans, 1 ppm in cocoa butter, 33-300 in dried mushrooms, and 148-286 in tobacco. The bromine levels in lettuce grown in fumigated hothouses was less than 10 ppm in 81/133 samples, 10-100 ppm in 24, 100-200 ppm in 19, 200-400 ppm in 7, and over 400 ppm in 2. Accumulation of bromide during successive fumigations was observed.

78-0500. Zobel, M. G. R. (Chem. Dev., Dept. Sci. Indust. Res., Petone, New Zealand) **Analysis of polychlorinated biphenyls, DDE, and DDT in human fat.** *N. Z. J. Sci.* 81: 627-633; 1975. (11 references)

To assess the degree of contamination of the New Zealand environment by PCB and acid-stable organochlorine pesticides, 35 samples of human fat were examined at autopsy for PCB, DDE, and DDT between September 1973 and July 1974. The fat samples were analyzed using silica gel chroma-

tography with a pentane solvent; data were studied by computer. Mean concentrations of 0.35 mg/kg PCB, 4.4 mg/kg DDE, and 0.46 mg/kg DDT were observed in the fat samples. When compared with data from 1965 to 1969, these results indicate little change in levels of DDE in human fat and declining levels of DDT (by a factor of 2 every 4 yr). The overall low levels of PCB in human fat indicate low levels of PCB in the New Zealand environment. Based on studies by Hammond in 1972 the levels of PCB in fat translates into a total dietary PCB intake which is 1500 times lower than the experimentally determined no effect level for mammals.

78-0501. Gebefuegi, I. ; Baumann, R.; Korte, F. (Inst. Oekol. Chem. Gesellsch. Strahlen-Umweltforsch. D-8000 Munich, Germany) **Photochemischer Abbau von 2,3,7,8-tetrachlordibenzo-*p*-dioxin (TCDD) unter simulierten Umweltbedingungen. [Photochemical degradation of TCDD under simulated environmental conditions.]** *Naturwissenschaften* 64(9): 486-487; 1977. (10 references) (German)

The photodegradation of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD), adsorbed in a molecular layer on silica gel, was studied in UV light at two different wavelengths (>290nm and >230nm). The degradation rates were 92% in long-wave UV and 98% in short-wave UV in 7 days. The findings indicate the possibility of the photodegradation of TCDD in sufficient sunlight even in the absence of organic proton donors.

78-0502. Shiue, J. ; Wang, T. S. (Soil Chem. Dep. Plant Nutr., Taiwan Sugar Res. Inst., Taiwan) **[Adsorption and desorption of urea herbicides on Taiwan sugarcane soils.]** *Rep. Taiwan Sugar Res. Inst.* 77: 27-38; 1977. (24 references) (Japanese)

The adsorption and desorption of phenylureas (monuron and diuron) were studied and related to pertinent properties of Taiwan sugarcane soils. The adsorption and desorption of phenylureas were influenced markedly by organic matter and CEC of the soils. Statistical analysis demonstrated that the adsorption of phenylureas on soil decreased considerably after the soil had been treated with hydrogen peroxide to destroy the humus. Increasing the humus content of the soils enhanced the adsorption. The mechanism of adsorption of the phenylureas on the humic substances was chemisorption as determined by infrared spectroscopy. The possible modes of reaction were discussed.

78-0503. Van Renterghem, R. (Cent. Rech. Agron. Etat-Gand, Station Laitiere, 9230 Melle, Belgium) **Quelques aspects de l'hygiene chimique du lait et des produits laitiers. [Chemical hygiene of milk and dairy products.]** *Rev. Agric. (Brussels)* 9(2): 355-378; 1976. (40 references) (French)

Contamination of milk and dairy products involves persistent liposoluble pesticides, PCBs and heavy metals. Of the pesticides lindane, heptachlor, DDT, dieldrin and a few other persistent and liposoluble chlorinated compounds get into milk through feed intake, but they are generally present in quantities which are well below maximum permissible levels. The ADI (acceptable daily intake in μg/day/kg body weight) and the actual daily ingestion in % of the ADI are for lindane 12.5 and < 1, for heptachlor 0.5 and 5, for DDT 5 and 80 and for dieldrin 0.1 and 70. The maximum permissible level of PCB's in milk is 2.5 ppm in milk fat. In the U.S.A., 60 of 15000 milk samples were found to be contaminated with an average of between 2 and 3 ppm. Of the heavy metals lead is a more important contaminant of milk than mercury, but milk's contribution to their total ingestion is very low. Still, the use of pesticides on feed crops should be limited to applications where there is no other alternative.

78-0504. Khelemskii, M. Z. ; Pel'ts, M. L.; Sapozhnikova, I. R.; Usmentseva, A. Z.; Kovaleva, N. Yu. (All-Union Sci. Res. Inst. Sugar Ind., USSR) **Ob ostatochnykh kolichestvakh polifenolov v produktakh sveklosakharnogo proizvodstva pri pererabotke svekly, obrabotannoi etimi preparatimi. [Polyphenol residues in sugarbeet products from beets treated with these preparations.]** *Sakh. Svekla* (8): 53-54; 1977. (2 references) (Russian)

Cossette, diffuser liquid, pulp, syrup and sugar from sugar beets treated with pyrocatechol or hydroquinone as fungicides during storage were analyzed. Following extraction with ethanol and reextraction with *n*-butyl alcohol and ethanol, thin-layer chromatographic determination was done on a silica gel plate, using butanol-acetic acid-water (4 : 1 : 5) as the solvent system and an aqueous solution of ferric chloride and potassium ferricyanide as the developing reagent. No pyrocatechol or hydroquinone were found in cossettes, diffuser liquid, syrup and the sugar, and only traces in beet pulp. Based on these findings, the use of pyrocatechol and hydroqinone has been authorized for the preservative treatment of sugar beet clamps at a rate of 3-4 liters/ton.

78-0505. Giam, C. S. ; Chan, H. S.; Neff, G. S.; Atlas, E. L. (Chem. Dep., Texas A&M Univ., College Station, TX 77843) **Phthalate ester plasticizers: A new class of marine pollutant.** *Science* 199(4327): 419-421; 1978. (14 references)

Phthalate ester plasticizers have been detected in the open-ocean environment. Samples consisting of water, sediment, air, and biota from the Gulf of Mexico and of water and air from the North Atlantic were anlayzed and found to contain two phthalate esters, di-(2-ethylhexyl) phthalate (DEHP) and di-n-dibutyl phthalate (DBP); the concentrations of polychlorinated biphenyls (PCB's) and DDT's (p,p'-DDT and p,p'-DDE) were also determined. Like the ubiquitous PCB's and DDT's, the phthalate plasticizers were found in almost all samples analyzed; DEHP was present at higher concentrations than the PCB's or DDT's in water and sediment. The environmental impact of the concentrations found in these studies, coupled with the continued high production and wide use of these plasticizers, requires assessment. (Author abstract by permission. Copyright 1978 by the American Association for the Advancement of Science)

78-0506. Osawa, T. ; Takahashi, K.; Inoue, Y.; Sugano, T.; Mishima, Y.; Kato, T. (Sendai Municipal Inst. for Public Health, Sendai, Miyagi, Japan) **[Investigation on persistent pesticides Part III. Organochlorine pesticide residues in fruits vegetables and in soil.]** *Sendai-Shi Eisei Kenkyusho Shoho (Annu. Rep. Sendai Munic. Inst. Public Health)* 6: 174-177; 1975-1976. (2 references) (Japanese)

Total BHC was scarcely detected in fruits and vegetables collected in Miyagi Prefecture in 1975 and 1976 except for cabbages and carrots in 1975 and Chinese cabbages and carrots in 1976; the major component was β-BHC. Dieldrin was only detected at 0.019 ppm in potato; this value was more than the allowable limit. In soil samples collected in the suburbs of Sendai city, total BHC was detected at 0.008-0.25 ppm (average of 0.59 ppm) in 1975 and at 0.006-0.24 ppm (average of 0.047 ppm) in 1976. Beta-BHC and *p,p'*-DDT were found in all samples. Also total DDT was detected at 0.006-0.12 (average 0.034) ppm in 1975, and at 0.002-1.03 (average 0.113) ppm in 1976. Total dieldrin was detected at 0.12-0.15 (average 0.442) ppm in 1975 and at nd-0.324 (average of 0.083) ppm in 1976. On the average, the residues of DDT, especially *p,p'*-DDT were larger.

78-0507. Osawa, T. ; Takahashi, K.; Inoue, Y.; Sugano, T.; Mishima, Y. (Sendai Municipal Inst. Public Health, Sendai, Miyagi, Japan) **[Investigation on persistent pesticides Part IV. Organochlorine pesticide residues in market milk and in fish and shellfish.]** *Sendai-Shi Eisei Kenkyusho Shoho (Annu. Rep. Sendai Munic. Inst. Public Health)* 6: 178-185; 1975-1976. (8 references) (Japanese)

Milk samples produced in Sendai city, market milk samples purchased in the city, and fish and shellfish supplied to the city were analyzed for BHC and DDT and its metabolites in 1975 and 1976. The results showed that even in market milk, total BHC and DDT were detected, although at low concentrations (0.002-0.020 ppm total BHC and trace-0.006 ppm DDT). The values were higher in 1975. Alpha-and beta-BHC accounted for almost all of the total BHC. Although α-BHC accounted for 40% of total BHC in 1975, it was not detected in 1976. The *p,p'*-DDE accounted for almost all the total DDT in milk samples. In fish and shellfish, total BHC was detected at nd-0.095 ppm in 1975 and at nd-0.102 ppm in 1976. Total DDT was nd-0.058 ppm in 1975 and nd-0.051 ppm in 1976. In fish and shellfish α- and γ-BHC were far larger than β-BHC. Dieldrin was detected at nd-0.008 ppm in 1975 and nd in 1976. All pesticide residues showed no reduction from 1975, to 1976. Fishes collected in and near sea contained more BHC, and fish from the Eastern China Sea showed higher contents of DDT.

78-0508. Osawa, T.; Takahashi, K.; Mishima, Y.; Mawariya, N. (Sendai Municipal Inst. of Public Health, Sendai, Miyagi, Japan) [Residues of **organochlorine pesticides and PCB in wild birds, especially in crows.]** *Sendai-Shi Eisei-Kenkyusho Shoho (Annu. Rep. Sendai Munic. Inst. Public Health)* 6: 186-187; 1975-1976. (2 references) (Japanese)

Residues of ogranochlorine pesticides and PCB were determined in crows captured in the suburbs of Sendai city on Dec. 8, 1975; the species were *Corvus coronoides japonensis* and *Corvus corone interpositas* (groups 1 and 2). The content of α-, β-, γ-, and delta-BHC, *p,p'*-DDT, *p,p'*-DDE, total DDT, dieldrin, and endrin in adipose tissues averaged 0.22, 0.89, 0.18, 0.14, 1.02, 4.3, 5.39, 0.22 and 0.70 ppm (fat basis) in 1 group (male), and 0.22, 0.25, 0.10, 0.006, 4.00, 47.0, 51.0, 0.081 and 0.012 in group 2 (females). The content of total DDT in the brain, the kidney, and the pectoral muscles was 0.01, 0.04, 0.25 and 4.1 ppm wet base in group 1, and 0.15, 0.16, 15.0 and 8.4 in group 2, respectively (fat basis). From these values, especially those in the adipose tissues of *Corvus c.i.*, it is presumed that the environmental pollution by DDT derivatives has considerably progressed.

78-0509. Takahashi, K.; Osawa, T.; Mishima, Y. (Sendai Municipal Inst. Public Health, Sendai, Miyagi, Japan) **[Organochlorine compounds in human hair and mother's milk].** *Sendai-Shi Eisei Kenkyusho Shoho (Annu. Rep. Sendai Munic. Inst. Public Health)* 6: 188-192; 1975-1976. (4 references) (Japanese)

Sixty-one samples of human hair and 18 samples of mother's milk obtained from the inhabitants of Sendai City from Oct., 1975 to Jan. 1976 were analyzed for PCB and total DDE. The content of total DDE in human hair ranged from 0.004 to 0.64 (average of 0.31) ppm and that in mother's milk ranged from 0.004 to 0.081 (average of 0.039) ppm. These values were determined on the same persons (18 females). It was found from other data the content of total DDE was higher in men than in women for each decade of life (on the average, 0.070 in women and 0.034 ppm in men). It was also found that there was a correlation between the contents of PCB and total DDE in human hair. Because total DDE was detected in almost all the samples of human hair it is considered that other organochlorine pesticide residues may be present in human hair, and that human hair could be used as an index of human pollution by organochlorine pesticides.

78-0510. Floru, S. ; Polizu, A.; Manolache, L. (Inst. Cercet. Pentru Protect. Plant. Bucharest 18, Romania) **Contributii la qunoasterea nivelului reziduurilor de pesticide organoclorurate la iepurele salbatic. [Organochlorine pesticide levels in wild hare.]** *St. Cercet. Biol., Seria Biol. Anim.* 27(4): 353-355; 1975. (11 references) (Rumanian)

Various organs and tissues (genitals, fat, meat, mammary gland, embryos, liver, lungs, kidneys, brain, and gastric content) of 15 wild hares shot or found dead in different hunting-grounds in Romania during May and June, 1970, were analyzed for organochlorine pesticide residues by a gas chromatographic method. Residues of α-BHC, lindane, DDE, and DDT were found in practically all organs and tissues, except for embryos and lungs, in which no DDE and DDT were found. The residue levels were 0.03-0.58 ppm for α-BHC, 0.03-0.48 ppm for lindane, 0.01-0.27 ppm for DDE, 0.02-0.54 ppm for DDT, and 0.07-1.74 ppm for the total organochlorine pesticides. The residue levels were highest in the fat and lowest in the lungs. The residue levels found in the fat and meat of shot specimens were below the tolerance.

78-0511. Monod, M. J.-L. (Inst. Phytopharm. de Marseille, Marseille, France) **Les residus de pesticides dans l'environment. [Pesticide residues in the environment.]** *Trav. Soc. Pharm. Montpellier* 37(1): 9-14; 1977. (French)

General ecological problems of organochlorine pesticides and PCBs are discussed. The annual DDT production worldwide is estimated at 100,000 tons. While most of the DDT is produced in Europe and the USA, DDT is used most heavily in underdeveloped countries. Precipitation, runoff, rivers and effluents are the principal sources of DDT in sea-water. The concentration in sea-water is only a fraction of 1 ng/liter, but DDT is concentrated in the consecutive links of the trophic chain (plankton, bivalves, fish, birds); the concentration factor may reach 500,000 for seagulls. DDT is able to inhibit the development of spawn in the embryonal sac.

78-0512. Mestres, R. ; Campo, M.; Tourte, J. (Lab. Chim. Appl. Expert., Fac. Pharm. Montpellier, France) **Residus de pesticides dans les denrees alimentaires. Donnees sur les fruits et legumes pour la periode 1973-1976. [Pesticide residues in foods. Data for fruits and vegetables for the 1973-1976 period.]** *Trav. Soc. Pharm. Montpellier* 37(1): 17-28; 1977. (4 references) (French)

Results of pesticide residue analyses in 1,617 food samples collected during the 1973-1976 period are presented. One hundred seventy-five samples of citrus fruits (lemons, tangerines, oranges, and grapefruits) were investigated; pesticide residues were found on 317 occasions, i.e., one sample contained, on the average, residues of more than one pesticide. Residue levels in excess of the tolerance were found in 6 samples on 7 occasions (3 for DDT and 4 for methyl parathion). Residue levels in excess of the tolerance were found in 5 cases among 467 samples of temperate zone fruits (cherries, strawberries, peaches, apples, pears, plums and grapes), with 2 cases being due to ethoxyquin and 1 each to azinphosethyl, dimethoate and phosalone. All in all, residues were found in 30 cases. No residues were found in wine, grape juice or fruit jui es. Pesticide residues in excess of the tolerance were found in 68 cases among 432 vegetable samples; residues were found in a total of 227 cases. Most of the unacceptable samples contained dithiocarbamates, dieldrin, benomyl, and quintozene. Wheat, rye and corn grains, wheat flour; and biscuits contained residues of at least one of the pesticides lindane, malathion, dimethoate, parathion, methyl parathion, sulfur; residues were found in 186 cases in 263 samples.

78-0513. Taran, P. N. ; Marchenko, V. M. (Inst. Colloid and Water Chem., Acad. Sci. Ukrainian SSR, USSR) **Okislenie nekotorykh dialkilditiokarbamatov v razbavlennykh vodnykh rastvorakh. [Oxidation of dialkyldithiocarbamates in diluted aqueous solutions.]** *Ukrain. Khim. Zh.* 43(10): 1030-1032; 1977. (7 references) (Russian)

The oxidation of ziram (2 mg/liter) and thiram (TMTD, 12 mg/liter) in water by different oxidizing agents (hydrogen peroxide, potassium permanganate, chlorine, ozone, and UV light) was studied. Ziram was efficiently oxidized, but the oxidized intermediate was identified as TMTD. The latter was not oxidized efficiently by hydrogen peroxide and potassium permanganate, but chlorine and especially ozone proved to be highly effective. Complete oxidation was achieved with chlorine at a rate of 7.5 mg/kg of TMTD and with ozone at a rate of 3.3 mg/mg of TMTD. The intermediate oxidation product obtained with ozone was identified as dimethyldithiocarbamic acid dimethylamine salt. Dimethylamine and carbon disulfide were found as ultimate metabolites. Oxidation with chlorine resulted in the formation of acidic sulfur compounds. Exposure to UV light for 60 min was also effective in terms of the degradation of TMTD. The findings indicate the possibility of decomposing ziram and TMTD in water by ozonation, chlorination and UV irradiation.

78-0514. Sheinina, R. I. ; Khalimova, U. Kh. (Central Asiatic Scientific Research and Design Institute of Food Industry, USSR) **Opredelenie defolianta v khlopchatnikovom shrote. [Determination of defoliant in cottonseed oil cake.]** *Veterinariya (Moscow)* (7): 93; 1977. (Russian)

Photometric method for the quantitative determination of butylcaptax in cottonseed oil cake is described. Following extraction with n-hexane, the extract is treated with chlorate ions, benzidine and 18n sulfuric acid over boiling water bath. The optic density is measured in a 1 cm cuvette. The concentration of butylcaptax is determined by means of a calibration curve. The sensitivity amounts to 1-2 mg/kg.

78-0515. Sawinsky, A. ; Pasztor, G. (Stn. Hyg. Epidemiol., Szolnok, Hungary) **Expositionspruefung bei der Reglone-Berieselung mittels Flugzeugen. [Study of exposure in regions sprayed by aircraft.]** *Z. Gesamte Hyg. Ihre Grenzgeb.* 21(11): 845-846; 1977. (15 references) (German)

The exposure of personnel to diquat was studied during the aerial spraying of farmlands with Reglone (diquat) liquid broth. After a flight time of 260 min, the diquat concentration in the air of the cockpit reached 4.5 mg/m^3, and a concentration of 61.5 μg/100 cm^2 was measured on the pilot's clothing. No diquat was found in urine samples of pilots who had been working under such conditions for 3-4 weeks. No diquat was found in the cockpit air and on the pilot's clothing after the ventilation and an air filter were put into operation. The ground personnel were exposed to high concentrations; the diquat concentrations found on the clothing of mechanics and of the workers loading and mixing the diquat broth were 3,500 and 8,750 μg/100 cm^2, respectively. The respective urine samples contained 6.3 (max. 29) and 19.6 (max. 30) μg of diquat per 100 ml.

78-0516. Loerz, R. (D-8961 Lauben/Oberallgau, Germany) **Neue Gesichtspunkte zur Beurteilung von Standarddiaten unter besonderer Berucksichtigung der Biozide. [New aspects in evaluating standard diets, with special reference to biocides.]** *Z. Versuchstierkd.* 19(1/2): 111; 1977. (5 references) (German)

The standard diets of laboratory animals and the cor-

responding raw materials are analyzed for residues of pesticides, their metabolites, heavy metals, and other impurities for qualitative evaluation. Results obtained for residues of PCB's and organochlorine pesticides in raw materials and diets were compared with the established standards.

78-0517. Miller, J. H. ; Keeley, P. E.; Thullen, R. J.; Carter, C. H. (Agric. Res. Serv., U.S. Dep . Agric., Shafter, CA 93263) **Persistence and movement of ten herbicides in soil.** *Weed Sci.* 26(1): 20-27; 1978. (34 references)

Ten herbicides were each applied at two rates to Panoche loam for 5 or 6 yr as soil-incorporated broadcast sprays directed to the base of cotton (*Gossypium birsutum* L. Acala SJ-1) at last cultivation. Chemical determinations 6 months after annual treatment showed that trifluralin (α,α,α-trifluoro- 2,6-dinitro- *N,N*-dipropyl- *p*-toluidine), nitralin [4-(methylsulfonyl)- 2,6-dinitro- *N,N*-dipropylaniline], benefin (*N*-butyl -*N*-ethyl- α,α,α-trifluoro- 2,6-dinitro- *p*-toludine), DCPA (dimethyl tetrachloro teraphthalate), and prometryn [2,4-bis(isopropylamino)-6- (methylthio) triazine] residues were essentially confined to the tilled zone of soil; whereas bensulide [*O,O*-diisopropyl phosphorodithioate *S*-ester with *N*-(2-mercaptoethyl) benzenesulfonamide], fluometuron [1,1-dimethyl- 3-(α,α,α-trifluoro-*m*-tolyl)urea], linuron [3-(3,4-dichlorophenyl)- 1-methoxy- 1-methylurea], and diuron [3-(3,4-dichlorophenyl)- 1,1-dimethylurea] residues were found below the tilled zone. At time of retreatment, annual residue determinations from the upper 15 cm of soil showed that nitralin and prometryn had dissipated completly and residues of the other herbicides were notably reduced as comparaed to levels at cotton harvest. One year after final treatment herbicide residues below the tilled zone were essentially nondetectable, except for diuron, linuron, and fluometuron. There was no evidence of herbicide accumulation in soil with repeated applications. (Author abstract by permission)

78-0518. Skipper, H. D. ; Volk, V. V.; Mortland, M. M.; Raman, K. V. (Dep. Agron. and Soils, Clemson Univ., Clemson, SC 29631) **Hydrolysis of atrazine on soil colloids.** *Weed Sci.* 26(1): 46-51; 1978. (24 references)

Infrared spectroscopy was used to study the hydrolysis of atrazine [2-chloro- 4-(ethylamino) - 6-(isopropylamino)-*s*-triazine] upon interaction with homoionic soil colloids. Montmorillonite, an allophanic soil clay, and a mintmorillonitic Coker soil clay were saturated with H^+, Al^{3+}, Cu^{2+}, and Ca^{2+} and treated with atrazine and hydroxyatrazine [2-hydroxy- 4-(ethylamino)- 6-(isopropylamino)- *s*-triazine]. Hydrolysis of atrazine was evaluated by the presence of a strong hydroxyatrazine carbonyl absorption band at 1745 cm^{-1}. The H^+ - and Al^{3+} - saturated montmorillonite and montmorillonitic Coker soil clay promoted atrazine hydrolysis while Ca^{2+} - or Cu^{2+}-saturated montmorillonite did not. A small degree of atrazine hydrolysis was detected in the Cu^{2+}-Coker soil clay. Dehydration of Ca^{2+}- or Cu^{2+}-Coker soil clay after equilibration with atrazine increased the hydrolysis of atrazine. The allophanic soil clay did not catalyze the hydrolysis of atrazine when the exchange complex was saturated with H^+, Al^{3+}, Ca^{2+}, or Cu^{2+}. Moreover, Al^{3+}-allophane was not sufficiently acidic to protonate hydroxyatrazine. Thus, a major difference exists between soil allophanic colloids, montmorillonitic soil clays, and montmorillonite as catalysts in the protonation and hydrolysis of atrazine. (Author abstract by permission)

See also 78-0536 78-0628 78-0665 78-0689 78-0700 78-0704 78-0705
78-0553 78-0653 78-0678 78-0697

78-0519. Fukuhara, N. ; Hoshi, M.; Mori, S. (Dep. Neurol., Brain Res. Inst., Niigata Univ., Niigata, Japan) **Core targetoid fibres and multiple cytoplasmic bodies in organophosphate neuropathy.** *Acta Neuropathol.* 40(2): 137-144; 1977. (41 references)

A 52-yr-old man with a history of alcoholic liver damage accidentally drank about 7 ml of a 50% solution of Dipterex (trichlorfon) and was hospitalized when he immediately became unconscious, with signs of cyanosis, profuse sweating, wheezing, excessive salivation, and bronchial secretion. With treatment he gradually recovered from the initial symptoms, but 16 days later noticed paresthesia, pain, and weakness in the legs, which progressed. Difficulty in walking and in moving his hands appeared after about 1 mo. From correlated histochemical and ultrastructural investigations of biopsy specimens, several pathological characteristics in the muscle fibers were observed. Most striking was a concurrence of core/targetoids and multiple cytoplasmic bodies in the same fibers. Foci of markedly reduced or absent oxidative enzyme activity were revealed in 71.6% of the type I fibers and in 3.4% of the type II fibers. Most of these foci were two-zoned core/targetoids. Cytoplasmic bodies were also revealed selectively in the type I fibers, in contrast with previous reports. Targets, targetoids, cores, and multicores appeared to be strongly related to each other pathogenetically and appeared to be due to the disturbance of some neurotrophic influences. In a biopsy specimen taken 220 days after exposure to the organophosphate, numerous sarcoplasmic masses were observed; they probably represented some special forms of regeneration.

78-0520. Rycroft, R. J. G. (St. Johns Hosp.Dis. Skin, London, England) **Contact dermatitis from organophosphorus pesticides** *Br. J. Dermatol.* 97(6): 693-695; 1977. (16 references)

Organophosphorus compounds vary widely in their toxicity to humans. Parathion requires full protective clothing when spraying crops with it, but malathion is so rapidly broken down by mammalian carboxyesterase that it can be used as a human delousing agent. Both parathion and malathion have been shown to sensitize human volunteers, but there have been no fully documented cases of allergic contact dermatitis involving these compounds. Allergic contact dermatitis from naled has been reported in women cutting off the tops of unflowered chrysanthemums within 2 hr of the crops being sprayed. Chlorfenvinphos produced irritant dermatitis when occluded on the forearm in an 80% emulsion for periods of up to 4 hr. Dichlorvos has caused dermatitis in dogs when used in tightly-fitting flea collars. Plondrel, an organophosphorus fungicide, has caused allergic hand dermatitis in rose-growers and florists. A depressed cholinesterase level can indicate the degree of exposure to organophosphorus pesticides with significant anticholinesterase activity. Preventing allergic contact dermatitis from a weak anticholinesterase agent such as Plondrel requires the same type of skin protection as is used to prevent systemic effects from powerful anticholinesterase pesticides.

78-0521. Saint Blanquat, G. (Inst. Physiol. 31400 Toulouse, France) **Les pesticides. [Pesticides.]** *Cah. Nutr. Diet.* 10(3): 43-48; 1975. (11 references) (French)

More than 60,000 preparations are now being marketed, each one containing one or several of 800 existing pesticides, calling for toxicological studies, the setting of standards, and their enforcement. Toxicological studies involve the determination of acute and chronic toxicity (to determine the metabolism of pesticides in the biological chain and maximum permissible safety levels for humans), the effect of diet on toxicity (a high lipid or low protein diet or alcohol consumption will have a profound effect on acute toxicity), interactions between pesticides (for example the organophosphorus acaricide omethoate increases the 50 DL of malathion in rats), accumulation (accumulation of DDT in fatty tissues, intensification of harmful effects, persistence). Standards pertaining to pesticides are published regularly by the FAO. The EEC in Luxembourg proposes maximum permissible levels adjusted to European conditions. In France pesticide standards are governed by a decree dated 5 July 1973. There is a lack of systematic enforcement because of the cost involved and for technical reasons.

78-0522. McLeod, W. A. (Vancouver, B. C., Canada) **Acute lindane poisoning.** *Can. Med. Assoc. J.* 118(2): 123,125; 1978. (1 reference)

A letter-to-the-editor points out that the insecticide lindane is sold for human use for the treatment of scabies and pediculosis. Aside from the risk of ingestion by children, absorption of lindane by infants may have neurotoxic effects. Infants and small children with scabies should be treated with other preparations. Overtreatment of adults with lindane may be hazardous.

78-0523. Anonymous **Kepone cleanup costly** *Chem. Wk.* 122(7): 19; 1978.

Battelle Pacific Northwest Laboratories and the U.S. Army Corps of Engineers estimate that removing Kepone (chlordecone) contaminated sediments from the James River and its tributaries in Virginia would cost 1-3-billion, 10 to 30 times more than previously estimated. It could take the river 50 to 100 years to cleanse itself of the insecticide. The possible cleanup methods range from dredging to destroying the contamination by using ozonation and ultraviolet light. According to Battelle, adding activated carbon to the river to decrease availability of Kepone to the food chain and the water column deserves further study, as does using retrievable sorbents to concentrate and remove the insecticide. Spoil fixation, in which sediment is dredged and mixed with a fixing agent, is one of the most promising methods. Ozonation combined with ultraviolet radiation has shown 80% Kepone removal, but requires more testing in turbid solutions.

78-0524. Gerstner, H. B. ; Huff, J. E. (Biomed. Sci. Sect., Info. Cent. Complex/Info. Div., Oak Ridge Natl. Lab., Oak Ridge, TN) **Selected case histories and epidemiologic exam-**

ples of human mercury poisoning. *Clin. Toxicol.* 11(2): 131-150; 1977. (21 references)

The various types of characteristic clinical pictures resulting from mercury intoxication and the circumstances under which they occur are described, based on illustrative case reports from the literature. Elemental mercury enters the human body through inhalation. Depending on air concentration and exposure time, elemental mercury produces two characteristic clinical pictures: acute pulmonary injury or chronic brain injury. The first is liable to be misdiagnosed as an upper respiratory infection, and the second has an insodious beginning, progressing over many months until total incapacitation is reached. Inorganic mercury compounds enter the human body through food, beverages, and dust inhaled in the air. The classical picture of inorganic mercury poisoning comprises of the superimposure of disturbances, mainly stemming from injuries to the alimentary canal and kidneys. The clinical course and ultimate outcome are determined by renal function. A nephrotic syndrome may also result from chronic intoxication. From the standpoint of public health, the problem of organomercurials reduces itself essentially to that of methylmercury. The methylmercury syndrome is characterized by insidious onset, long duration of clinical sequelae, guarded prognosis with respect to complete recovery, and almost complete confinement to the central nervous system, particularly the optical cortex and cerebellum. Methylmercury ingestion during pregnancy may have a devastating effect on the central nervous system of the fetus. Epidemic outbreaks of methylmercury poisoning have recurred following widespread ingestion of contaminated fish and dressed seed grain. Epidemic outbreaks of poisonings have also followed widespread ingestion of grain treated with ethylmercury-*p*-toluene sulfonanilide and grain treated with a mixture of phenylmercury acetate and ethylmercury chloride.

78-0525. Commoner, B. (Ctr. Biol. Nat. Sys., Washington Univ., St. Louis, MO) **Seveso: the tragedy lingers on.** *Clin. Toxicol.* 11(4): 479-482; 1977.

In July, 1976 a chemical reactor accidentally vented several kilograms of dioxin just upwind from Seveso, Italy. In March, 1977, more than 400 residents were suffering from chloracne, which usually indicates an exposure to dioxin sufficient to cause serious and long-term systemic effects. Some of the women exposed to dioxin while pregnant have had therapeutic abortions; examinations of parts of embryos have been inconclusive relative to fetal defects. The incidence of birth defects and spontaneous abortions is not regarded as significantly higher than usual for the local population. Since chloracne has occurred among children who were away from the sea from the summer, continued exposure to dioxin appears not to have been adequately controlled. Little effort was made to prevent the spread of dioxin-contaminated soil. Dioxin buried under 6 in. of soil in test plots in the United States broke down with a half-life between 190 and 330 days. It would probably taken about 10 yr for the most heavily contaminated soil in Seveso to fall to about 340 parts per trillion of dioxin, the contamination level in another test area in which wild mice showed a 40% decrease in fertility. It is generally agreed that active measures must be undertaken to decontaminate the soil and houses in Seveso. A photochemical technique in which a contaminated surface, first sprayed with ethyl oleate, is subjected to ultraviolet radiation has given promising results in tests on contaminated walls and streets in Seveso. Italian officials seem to have already decided that the soil should be decontaminated by incineration at 1000°C for 30 to 40 min, a method based on theoretical considerations. Because this is an unprecedented problem, laboratory-scale and pilot-scale tests of several decontamination methods are recommended.

78-0526. Sell, M. G., Jr. (Univ. Florida, Gainesville, FL) **Modeling the response of mangrove ecosystems to herbicide spraying, hurricanes, nutrient enrichment and economic development.** *Diss. Abstr. Int. B* 38(7): 3028; 1978.

Models of energy flow through mangrove forests were developed and simulated to assess the impact of tropical storms, herbicides, nutrient enrichment, and economic development. Simulation of the effect of herbicide spraying on the mangrove forests in the Rung-Sat district of South Vietnam suggested that complete mangrove recolonization of sprayed areas may take 55 years to more than 100 years. Rates of recolonization were strongly dependent on the availability of seedlings and amount of wood-cutting. Reforestation can be accelerated by planting seedlings. Spraying of a mangrove forest on Marco Island, Florida, showed that white mangrove (*Laguncularia racemosa*) was the most susceptible of the three species present, followed by red mangrove (*Rhizophora mangle*) and black mangrove (*Avicennia germinans*). The sprayed sites seemed to be recolonized at a slower rate than the harvested sites. Detritus-feeding snails were reduced in numbers after the spraying but crab populations were little changed. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 77-29,278)

78-0527. Woods, C. (Author address not given) **Grapefruit fumigant under review.** *Fl. Grow. Rancher* 71(1): 12-13; 1978.

The only pesticide currently approved by both the U.S. and Japan to prevent the spread of the Caribbean fruit fly to Japan, ethylene dibromide (EDB), is a suspected carcinogen. According to the Environmental Protection Agency, EDB is a potential health hazard to fumigation workers who handle or inhale the chemical. A Rebuttable Presumption Against Registration (RPAR) has been issued against EDB. Manufacturers may attempt to disprove the estimated risk in order to continue registration of the pesticide. According to EDB users, the residue on grapefruit peel disappears within four days and therefore the fungicide cannot be carcinogenic. Improvements to prevent exposure of workers fumigating grapefruit include double caulking of walls separating fumigation chambers from corridors, continuously running exhaust fans, and automation of the fumigation process. Methyl bromide an phosphine are suggested alternatives to EDB as a grapefruit fumigant.

78-0528. Weil, L. (Inst. Wasserchem. Chem. Balneol., TU Munchen, D-8 Munich 70, Germany) **Pflanzenschutzmittel und ihre Auswirkungen auf die Gewaesser. [Pesticides and their effects on water bodies.]** *Gas Wasser Waerme* 31(7): 225-229; 1977. (14 references) (German)

General problems of organochlorine pesticides in water bodies and studies on their removal from water are discussed. The current drinking-water and industrial water preparation technology, such as flocculation, chlorination, and ozonation, is insufficient. Hydrophilic Polyethylene-Liposorb (Hoechst) was found to efficiently remove organochlorine pesticide residues from water during the drinking-water preparation process. When combined with activated carbon, Liposorb is also suitable for the elimination of water-soluble substances. Soil with high humus content (at least 10%) is an effective adsorbent for organochlorine pesticides from water, and facilitates their retention and degradation.

78-0529. Vinogradova, V. K. ; Kalyaganov, P. I.; Melnikova, L. V.; Elizarov, G. P.; Golova, I. A. (Inst. Gig. Tr. Prof. Zabol., USSR) **Effektivnost' ozdorovitel'nykh meropriyatii v proizvodstavakh po pererabotke izomerov geksakhlortsiklogeksana. [The effect of health measures in industries processing "non-toxic" isomers of hexachlorocyclohexane.]** *Gig. Tr. Prof. Zabol.* (5): 24-27; 1976. (Russian)

Working conditions and health status of workers manufacturing hexachlorobenzene (HCB) and sodium pentachlorophenolate (PCPS) were studied. Complex health measures implemented in HCB and PCPS production helped reduce the levels of toxic materials in the air. This was accompanied by a significant decrease in the incidence of occupational disease. Currently there are only isolated facial chloracne cases among workers engaged in HCB and PCPS production. Improving working conditions and occupational health could be achieved while increasing output as much as 3-5 times.

78-0530. Panshina, T. N. (Inst. Hyg. Toxicol. Pestic. Polym. Plastics, Kiev, USSR) **Ustanovlenie predel'no dopustimykh kontsentratsii i orientirovochnykh bezopasnykh urovlei vozdeistviya gerbitsidov galoidisameshchennykh anilidov karbonovykh kislot v vozdukhe rabochei zony. [Establishment of maximum permissible concentrations and approximate no-effect levels for halogen-substituted carboxylic acid anilides in the air of a production sector.]** *Gig. Tr. Prof. Zabol.* (12): 30-33; 1977. (8 references) (Russian)

Derivatives of halogenated carboxylic acid anilides are used as herbicides in various types of agriculture. They can be detected in quantities ranging from tenths of milligrams/cm^3 to milligrams/m^3 in the air in production areas. Oral, dermal and respiratory toxicity of some pesticides were determined in farm animals. Maximum permissible concentrations were established at 0.1 mg/m^3 for propanide, (propanil) 0.5 mg/m^3 for ramrod (propachlor), and 1 mg/m^3 for solan (pentanochlor) in the air of production areas. Approximate safe levels of 0.1 mg/m^3 for dicryl, 0.3 mg/m^3 for delachlor, 0.5 mg/m^3 for Suffix (benzoylprop-ethyl), and 0.5 mg/m^3 for Lasso (alachlor) have been estimated from linear and polynomial regression equations.

78-0531. Leoni, V. ; Puccetti, G. (Ist. Ricerca sulle Acque del CNR, Italy) **La contaminazione delle acque da pesticidi. Prospettive sull' impiego dei polimeri per l'estrazione di microinquinanti organici a fini analitici e technici. [Water pollution by pesticides: prospects of using polymers for extracting trace organics for analytical and treatment purposes.]** *Ingegnere* (7/8): 283-288; 1977. (28 references) (Italian)

The Rohm & Haas synthetic resins Amberlite XAD-2 and XAD-4 and the Dutch Enka 2,6-diphenyl- *p*-phenylene derivative Tenax were tested as extractants (for analytical and potential treatment purposes) of trace quantities of chlorinated and organophosphorus pesticides. These pesticides have been found to contaminant, for example, the waters of the Tiber river at twice the permissible level. The water was filtered through a column of the polymers, and the adsorbed pesticides were subsequently dissolved in organic solvents and analyzed. Amberlite was found to require lengthy purification before use to eliminate substances interfering with subsequent gas chromatographic analysis. In contrast, Tenax, free of impurities interfering with gas chromtography, removed more than 90% of the pesticides and polycyclic hydrocarbons in water samples even in the presence of surfactants and emulsifiers. The presence of mineral oil required preliminary filtration with glass wool and Celite 545. With DDT-like pesticides the best results were obtained by continuous liquid/liquid extraction using organic solvents rather than by adsorption on Tenax. If the contaminated water contains solids adsorbing pesticides prefiltration is necessary before adsorption on Tenax resulting in the disadvantage of requiring two different analyses in succession. The Tenax method may in future find application in the purification of industrial effluents in addition to its use for analysis.

78-0532. Montelatici, L. ; Pavesi, M. A. (Lab I.T.I.S. "N. Baldini", Ravenna, Italy) **Considerazioni sul D.P.R.n.1255 del 3 agosto 1978 e sul D.M. dell'11 agosto 1970 circa l'uso dei diserbanti a base di 2,4,5-T e 2,4,5-TP. [Considerations on Decree No. 1255 (August 3, 1968) and the mandate of Aug. 11, 1970 on the use of 2,4,5-T and 2,4,5-TP based herbicides.]** *Inquinamento* (6): 31-35; 1977. (5 references) (Italian)

Since the D.M. (Ministerial Decree) of 11 August 1970, supplementary to D.P.R. (Decree of the President of the Republic) No. 1255 of 3 August 1968 forbidding the use of herbicides containing 2,4,5-T and 2,4,5-TP has not removed from Italian commerce products sold under proprietary names containing these compounds, the above decrees require amplification and updating including the following proposed provisions. Public health authorities should eliminate the risk deriving from herbicides containing the above compounds by prohibiting the sale of all formulations containing them. All commercial herbicides containing chlorinated dibenzodioxins and dibenzofurans should be reclassified as belonging into the first instead of the second toxicological class of the list enclosed to D.P.R. No. 1255.

Manufacturers selling proprietary products must declare the chemical composition in percentages and list the products which could potentially contain chlorodioxins and chlorobenzofurans as impurties. Manufactureres of herbicides containing 2,4-D, 2,4-DB and dichloroprop as active ingredients must in addition to declaring the raw materials and intermediate products entering into production also declare the manner of waste disposal because of the poential environmental damage from the accumulation of residues. Land exposed to repeated treatment with the herbicides contained in the above-mentioned list must be subjected to periodic analytical control to prevent potential accumulation of harmful levels of the above toxic substances.

78-0533. Lores, E. M. ; Sovocool, G. W.; Harless, R. L.; Wilson, N. K.; Moseman, R. F. (Chem. Br. (MD-69), Environ. Toxicol. Div., Health Eff. Res. Lab., U.S. Environ. Prot. Agency, Research Triangle Park, NC 27711) **A new metabolite of chlorpyrifos: Isolation and identification** *J. Agric. Food Chem.* 26(1): 118-122; 1978. (12 references)

A new metabolite of chlorpyrifos was discovered in a human poisoning case in which a lethal quantity of the pesticide was ingested. The metabolite was isolated from a human liver extract. After extensive cleanup, the metabolite was subjected to various instrumental analyses such as gas chromatography, mass spectrometry, and nuclear magnetic resonance. The metabolite was identified as a compound similar to chlorpyrifos with a methylthio (-SCH_3) group substituted for a chlorine on the pyridinol ring. The method of isolation and the data obtained from the instrumental analyses are presented. (Author abstract reprinted by permission of the American Chemical Society)

78-0534. Anonymous **Rodenticide toxicosis in a horse.** *J. Am. Vet. Med. Assoc.* 172(3): 270-271; 1978. (2 references)

A three-year-old quarter horse gelding ingested 0.25-0.50 kg of *N*-3-pyridyl methyl *N'-p*-nitrophenyl urea (Vacor), a rodenticide. The symptoms manifested within 24 hr after poisoning included severe muscular fasciculations, dilated pupils and profuse sweating. The serum and blood chemical values were PCV, 50%, total plasma protein, 9.0 g/dl; serum glucose, 418 mg/dl; creatinine phosphokinase, 430 IU/l; serum glutamic-oxalacetic transaminase, 266 IU/l; and serum alkaline phosphatase, 169 IU/l. Treatment included 2.2 mg of nicotinic acid/kg of body weight iv; four subsequent injections of 1 g nicotinic acid, 7 l of mineral oil and 90 mg of activated charcoal powder given orally, and 18 l of lactated Ringer's solution iv. The rodenticide manufacturer's instructions, all of which are for smaller animals, include repeated nicotinic acid injections and emptying the animal's digestive tract. The horse recovered and was clinically normal three months later. Three other horses poisoned with Vacor had similar symptoms as well as intense abdominal pain, hindlimb weakness, ataxia, and persistent inappetence.

78-0535. Craft, A. W. ; Sibert, J. R. (Royal Victoria Infirm., Newcastle Upon Tyne, England) **Accidental poisoning in children.** *J. Appl. Med.* 3(10): 1013-1019; 1977. (39 references)

Different types of poisonings which commonly occur among children, their symptoms, and methods of treatment are discussed. Paraquat represents a major source of herbicide poisoning in children, causing damage to the lungs, liver, and kidneys with no known effective treatment. Fuller's earth and magnesium sulphate should be given orally after paraquat poisoning, and diuresis and hemodialysis should be started as soon as possible. If possible, the patient should be nursed in a hypoxic atmosphere and the administration of propranolol may be tried to compete for binding sites with paraquat. Superoxide dismutase may also be used.

78-0536. DeKraay, W. H. (Ottumwa, IA) **Pesticides and lymphoma in Iowa.** *J. Ia. Med. Soc.* 68(2): 50-53; 1978. (6 references)

An excessive incidence of lymphoma in counties along the Des Moines and Nishnabotna rivers in Iowa has been detected. Cities that use water from shallow wells along the river plain have high rates of lymphoma. Cities located along the rivers but using deep wells have a lymphoma incidence within normal limits. Some evidence indicates that higher levels of dieldrin in drinking water may be related to an increased incidence of lymphoma, but the results are inconclusive. Maximum annual values of dieldrin in river water ranged from 3 parts per trillion in the Des Moines River at Ottumwa to 65 parts per trillion in the Nishnabotna River at Hamburg. Well water in cities with low levels of lymphoma did not contain more than 0.5 parts per trillion of dieldrin.

78-0537. Gervais, C. ; Simon, L.; Fabre, S. (Author address not given) **[Acute parathion intoxication with refractory hypoxia manifested in bronchopneumonia with enterobacteria superinfection.]** *J. Med. Montpellier* 10(9-10): 47; 1975. (French)

A 48-yr-old man exposed chronically to parathion developed antibiotic-resistant fatal acute bronchopneumonia with enterobacter superinfection. The first signs were manifested three days before the termination of exposure to parathion. Severe respiratory insufficiency with refractory hypoxia and hypocapnia, muscarinic syndrome and sharp drop of the cholinesterase activity were diagnosed 18 days after the last exposure. Parathion was found in the urine.

78-0538. Nielsen, E. F. (Morristown, NJ) **Charcoal hemoperfusion for insecticide overdose.** *J. Med. Soc. N.J.* 75(2): 177; 1978. (3 references)

A 35-yr-old man intentionally ingested 90 grams of chlordane and developed neurological involvement. He was successfully treated with charcoal hemoperfusion. The patient was given oral magnesium sulfate, and hemoperfusion was begun 4 hr later. Hemoperfusion was accomplished at a flow rate of 200 ml/min for four hours using an acrylic encapsulated activated charcoal column. Chlordane levels were 1800 ppb before hemoperfusion, 667 ppb immediately

after hemoperfusion, and 481 ppb 4 days after hemoperfusion. Chlordane levels average 0.55 ppb in individuals occupationally exposed, and only trace amounts can be detected in the general population. The patient had no subsequent clinical symptoms.

78-0539. Lagrue, G. ; Kamalodine, T.; Guerrero, J.; Hirbec, G.; Zhepova, F. ; Bernaudin, J. F.(Service de Nephrologie, Hopital Henri-Mondor, 94000 Creteil, France) **Nephropathies glomerulaires primitives et inhalation de substances toxiques. [Primary glomerular nephropathies and inhalation of toxic substances.]** *J. Urol. Nephrol.* 83(4/5): 323-329; 1977. (5 references) (French)

Inquiry was conducted among 108 patients (83 men, 25 women, aged -20 to 60+ years) with primary glomerular nephropathy concerning regular exposure to toxic substances, such as solvents, paints, varnishes, petroleum derivatives, cutting oils, household detergents, pesticides, fungicides and fertilizers. Exposure to some of these substances was ascertained in 67 cases, with 27 patients having been exposed to organic solvents, 9 to petroleum derivatives, and 7 to paints, varnishes and glues. Exposure to pesticides was not found.

78-0540. Baker, E. L., Jr.; Zack, M.; Miles, J. W.; Alderman, L.; Warren, McW.; Dobbin, R. D.; Miller, S.; Teeters, W. R. (Bur. Epidemiol. Tropic Dis., Cent. Dis. Control, Atlanta, GA 30333) **Epidemic malathion poisoning in Pakistan malaria workers.** *Lancet* 1(8054): 31-34; 1978. (18 references)

An epidemic of malathion poisonings that occurred in 1976 among Pakistan malaria control workers is discussed. Over 2,800 cases of poisonings resulted from subcutaneous absorption of the pesticide due to poor work habits. Low red-cell cholinesterase activities were associated with victims of the epidemic and toxicity was greatest when isomalathion, a degradation product of malathion was involved. The adoption of better work practices reduced the incidence of poisonings among the workers, and the epidemic was under control within 3 months.

78-0541. Dearnaley, D. P. ; Martin, M. F. R. (Dep. Neurol., Atkinson Morley's Hosp., Copse Hill, Wimbledon SW20 0NE) **Plasmapheresis for paraquat poisoning.** *Lancet* 1(8056): 162; 1978. (3 references)

A case of paraquat poisoning has been successfully treated by plasmapheresis. A 32-yr-old man was hospitalized after swallowing about 50 ml of a 5% paraquat solution. Following initial therapy using gastric lavage, activated charcoal, magnesium sulfate, and fuller's earth, plasmapheresis was started 7 hr after paraquat ingestion, and a 2200 ml plasma exchange was made over 6 hr. Plasmapheresis was repeated for 3 hr beginning 30 hr after ingestion with a 1.7 liter plasma yield. The first plasmapheresis reduced the paraquat level in blood from approximately 85 μg/l to approximately 20 μg/l, and the second reduced the paraquat level in blood from approximately 25 μg/l to approximately 6 μg/l. Plasmapheresis is a safe technique which can be done rapidly in a general medical ward.

78-0542. Jaros, F. (Trencin Hosp., Osviencimska 1960-II-12, Czechoslovakia) **Acute percutaneous paraquat poisoning.** *Lancet* 1(8058): 275; 1978. (7 references)

A 44-yr-old man failed to dilute paraquat sufficiently and used an old sprayer which leaked fluid freely down his neck, back, and legs. Six days later, he was hospitalized with repiratory difficulties, which progressed to total respiratory insufficiency requiring artificial ventilation. His blood urea nitrogen and serum creatinine were raised, and protein and blood cells were found in his urine. Three days after being hospitalized, he died of renal and respiratory insufficiency. Dry bloody necrosis of the skin at several sites on the neck and scrotum and edema and necrotizing alveolitis in the lungs were found at autopsy. The kidneys showed parenchymal dystrophy, and steatosis was apparent in the liver. This case shows that the dermal absorption of improperly diluted paraquat can result in death.

78-0543. Umarova, D. T. (Department of Microbiology, Immunology and Virology, Central Asiatic Institute of Pediatrics, Tashkent, USSR) **Vliianie iadokhimikatov na enterobakterii pri khronicheskom nespetsificheskom enterokolite. [Effect of pesticides on *Enterobacteriaceae* in chronic nonspecific enterocolitis.]** *Med. Zh. Uzb.* (12): 50-53; 1976. (Russian)

Bacteria including 281 strains of *Enterococcus*, 195 strains of *Escherichia*, 112 strains of *Aerobacter*, 90 strains of *Streptococcus pyogenes*, 22 strains of *Streptococcus bactis*, 92 strains of *Staphylococcus*, 61 strains of *Paracolobactrum*, 84 strains of *Proteus*, 30 strains of *Clostridium*, 26 strains of *Lactobacillus*, 37 strains of *Alcaligenes*, 19 strains of *B. alcalescens dispar*, 5 strains of *B. pyocyaneum*, and 6 strains of *Klebsiella* were isolated from patients with chronic nonspecific enterocolitis who were occupationally exposed to agricultural pesticides. The bacteria were investigated for their ability to produce plasma coagulase, hyaluronidase, fibrinolysin, lecithinase, Duran-Reynals' permeability factor, catalase, urease, hemotoxin, necrotoxin, enterotoxin, and leukocidin. The findings obtained indicate a possible unfavorable effect of pesticide exposure on the morphological and functional status of the intestine, wherein the mucosa more or less completely looses its barrier function, leading to reduced resistance. This implies optimal conditions for the development of aggressive varieties in the microflora. The aggressive forms of intestinal microorganisms found in the exposed workers implies a potential active involvement of these forms in the development and progress of chronic intestinal dysfunction.

78-0544. Cohn, W. J.; Boylan, J. J.; Blanke, R. V.; Fariss, M. W.; Howell, J. R.; Guzelian, P. S. (Dep. Med. Pathol., Med. Coll. VA) **Treatment of chlordecone (kepone) toxicity with cholestyramine. Results of a controlled**

clinical trial. *N. Engl. J. Med.* 298(5): 243-248; 1978. (24 references)

Thirty-two men industrially exposed to the organochlorine pesticide, chlordecone, had rates of chlordecone excretion in the hepatic bile varying from slightly over 1.0 mg/day to 10.3 mg/day, apparently dependent upon the total-body content of chlordecone. Only 5 to 10% of the biliary chlordecone entering the lumen of the duodenum appeared in the feces. Because it appeared that chlordecone may be reabsorbed in the intestine, a clinical study was conducted in which patients were given cholestyramine, a nonabsorbable anion-exchange resin that binds chlordecone. A 24 g/day cholestyramine treatment increased fecal excretion of chlordecone by 3.3-17.8 fold. In 11 of 12 patients given 16 g/day cholestyramine, cholestyramine treatment accelerated the rate of disappearance of chlordecone from blood in comparison with the same patient's rate of chlordecone disappearance from blood prior to treatment. The difference was significant in 7 patients. The average half life of chlordecone in blood was reduced from 165 days to 80 days in patients given cholestyramine. The rate of disappearance of chlordecone in the blood decreased significantly in only one of 10 patients given a placebo instead of cholestyramine. The average half life of chlordecone in blood of patients receiving a placebo decreased only slightly, from 141 days before treatment to 139 days while receiving the placebo.

78-0545. Peters, J. M. (Harvard Sch. Public Health, Boston, MA 02115) **The kepone episode: another warning.** *N. Engl. J. Med.* 298(5): 277-278; 1978. (2 references)

For 16 months beginning in February 1974, Kepone (chlordecone) was produced in Hopewell, Virginia, with little attention to industrial hygiene, allowing the workers to come into dermal, respiratory, and probably alimentary contact with this pesticide. Contamination of the Hopewell, Virginia, sewage system, and as a consequence, the James River, by Kepone resulted in a ban on fishing in December, 1975, and parts of the Chesapeake Bay have also been contaminated. Since occupational diseases are frequently difficult to differentiate from naturally occurring disease, epidemiologic studies of working populations are frequently needed to determine the presence of occupational factors. The Toxic Substances Control Act, which requires testing of new chemicals to determine their effect on health, is so new that its effects are not yet known. Doctors are not prepared by training to recognize diseases of occupational origin. It is recommended that doctors take good occupational histories and, when an occupational cause of illness is suspected, notify the local, state, or federal agency responsible for occupational health. It is now necessary to wait through the induction period to see if Kepone is a human carcinogen.

78-0546. Anonymous. **Chemical and biochemical methodology for the assessment of hazards of pesticides for man.** *WHO Tech. Rep. Ser.* 560: 5-27; 1975. (559 references)

Improved chemical and biochemical technology is needed for safe use of pesticides. Most pesticides acceptable in control of disease vectors do not produce structural damage to the nervous system in mammals, and their action is essentially reversible. Measurement of inhalation and dermal exposure and chemical analysis of biological materials for pesticides and metabolites are discussed. The pesticides discussed include DDT, lindane, other chlorinated hydrocarbons, parathion, EPN, Abate (temephos), fenitrothion, dicapthon, fenchlorphos, dursban (chlorpyrifos), carbaryl, propoxur, pentachlorophenol, and DNOC. The manner in which a pesticide is used should be considered before launching an environmental monitoring program. Air and static bodies of water should be sampled for pesticides used in ULV applications; water, mud, and fish should be sampled for larvicides. Analytical methods discussed include spectrophotometry, thin-layer chromatography, and gas-liquid chromatography. Further research is recommended on environmental sampling; the relationships between absorption, metabolism, and excretion of pesticides and their degradation products in mammals; cholinesterase determination methods; and simple analytical techniques. When new pesticides or application methods are used, the blood or urine of exposed persons should be monitored, and inhalation and dermal exposure should be assessed.

78-0547. Hay, A. (Author address not given) **Vietnam's dioxin problem.** *Nature (London)* 271(5646):597-598; 1978.

More than 10% of the inland forests, 36% of the mangrove forests, and 3% of the cultivated land in South Vietnam is estimated to have been sprayed at least once with herbicides. Herbicide spraying diminished after 1969, when it was found that 2,4,5-T was teratogenic in rats and mice. Commercial preparations of 2,4,5-T contained a highly toxic contaminant, dioxin, in concentrations of 0.05-47 ppm. There is little published information on the effects of this practice, and some authorities fear that information on the herbicide damage would be used for military purposes. A higher than normal incidence of chromosome damage has been detected in people exposed to 2,4,5-T and its dioxin contaminant, but the number of people involved is too small to indicate statistically significant trends. These reports have been criticized because a level of chromosomal aberrations reported as abnormal may be considered normal in the West and Japan. It has been suggested that dioxin may be responsible for an increase in primary carcinoma of the liver, but herbicide spraying began in 1962, and most carcinogens have a latency period of between 20 and 30 yr. It has been reported that peacocks, which normally number about 40 per hectare, are completely absent in sprayed areas, and that pheasant populations are reduced.

78-0548. Gillespie, B. ; Eva, D.; Johnston, R. (Cornell Univ. Ithaca, NY) **A tale of two pesticides.** *New Sci.* 77(1089): 350-352; 1978.

In the U.S., an Environmental Protection Agency Administrative Law Judge prohibited the use of dieldrin due to its carcinogenicity in mice. Epidemiological evidence on the results of human exposure was considered inadequate. In

Britain, the Medical Panel of the Advisory Committee on Pesticides and Other Toxic Chemicals (ACPOTC) considered the lack of positive findings from the epidemiological surveys stronger evidence than the animal tests, on the grounds that experts could not agree as to whether the lesions in mice represented malignant tumors. In the U.S. advice was largely provided by scientists who believe, in accord with molecular biological principles, that the presence of a carcinogen is sufficient to cause a cell to become cancerous. In Britain, the recognized experts held to a traditional toxicological model, stating that cells are transformed to a cancerous state only by prolonged contact between cell and chemical. In issues such as this, it is virtually impossible to separate the scientific and political factors. It is recommended that the public be more strongly represented in decision-making that affects health in Britain.

78-0549. Ichii, S. ; Dozono, M. (Ichii Ophthalmic Clin., Moriguchi, Osaka, Japan) **[Electroretinographic (ERG) studies on toxic myopia due to organophosphorus pesticides. Part 1. Diagnosis and therapy of myopic patients due to organophosphorus intoxication under loading with PAM.]** *Nippon Gankagakkai Zasshi (Acta Soc. Ophthalmol., Jpn.)* 81(8): 1206-1214; 1977. (Japanese)

ERG tracings from suspected victims (37) of organophosphorus pesticide intoxication with myopia, from normal myopic patients (18), from normal persons (30), and from patients with hereditary retinal pigmented degeneration (10) were examined before and after intravenous infusion of PAM (pralidoxime every 4 days). All cases with suspected organophosphorus intoxication showed significant improvement in the ERG and of visual acuity, while no such tendency was shown in the case of common myopia patients. The prognosis was better in the case of suspected victims of organophosphorus pesticide intoxication whose ERG had showed supernormal states; improvement was observed upon administration of 1.5 g (24 days) of PAM. In the case of suspected patients whose ERG had showed subnormal states, it took a longer time (120 days) and larger amounts of PAM (7.5 g) to improve the ERG and visual acuity (naked eye). These facts clearly indicate that in cases where improved ERG and visual acuity were seen after PAM had been attacked by organophosphorus pesticide on their retina, the ERG could be useful for early detection of these cases.

78-0550. Bismuth, C. ; Caramella, J. P.; Rosenberg, N. (Clin. Toxicol., Hopital Ferdinand Widal, F 75010 Paris, France) **Rhabdomyolyse au cours d'intoxication par la strychnine - A propos de 2 cas. [Rhabdomyolysis in strychnine poisoning - 2 cases.]** *Nouv. Presse Med.* 6(38):3549-3550; 1977. (3 references) (French)

Rhabdomyolysis was observed in two patients (women, aged 17 and 38 years) following non-fatal, voluntary poisoning by strychnine. Convulsions, metabolic acidosis, and increased creatinine phosphokinase activity were found. The patients complained of pronounced muscular weakness, but it was substantiated clinically in one case only. Rhabdomyolysis following convulsant poisoning has not previously been described in the literature.

78-0551. Wakabayashi, T. ; Chihara, M.; Nishimoto, M.; Kuroda, T.; Shiaku, Y. (Dep. of Collective Ther., Sect. Anesthesia, Okayama Univ. Sch. Medicine, Okayama Prefecture, Japan) **[A therapeutic experience in the ICU on a patient acutely intoxicated with a herbicide, paraquat dichloride.]** *Okayama Igakkai Zasshi (J. Med. Assoc. Okayama)* 89(9-10):1389; 1977. (Japanese)

A patient with acute intoxication due to paraquat dichloride was treated by forced diuresis, administration of high steroid doses, and respiratory support in the ICU. Without improvement of respiratory status, the patient died on the 18th day of hospitalization. Findings on autopsy were: very severe alteration in the lungs with intense fibrotic edema accompanied by formation of hyaline membrane, sloughing of bronchial mucosa and formation of squamous epithelium; desquamation of uriniferous tubules and enlargement of tubes and cavities of the kidney; centro-lobular atrophy and stagnation of bile in the liver; and atrophy of adrenal cortex.

78-0552. Fitzgerald, G. R. ; Barniville, G.; Black, J.; Silke, B.; Carmody, M.; O'Dwyer, W. F. (Jervis St. Hosp., Dublin, Ireland) **Occupational paraquat poisoning.** *Q. J. Med.* 46(184):561-562; 1977.

Paraquat poisoning is more common in Ireland than in other parts of the world. Twelve patients of a total of 121 claimed at the time of hospital admission that they had been poisoned by paraquat during normal agricultural use with hand spraying equipment. The more seriously poisoned patients had deviated grossly from the manufacturers' instructions on handling paraquat; milder cases included three in which the patients appeared to have followed instructions explicitly. While the spray operator was usually at fault, a small doubt remains concerning the safety of paraquat properly used. The series of 121 cases indicated that accidental paraquat poisoning is becoming less common. Very minor degrees of poisoning do not warrant treatment which is hazardous in itself. The absence of rapid measurements of paraquat in plasma poses a major difficulty in determining the severity of poisoning. Safety measures should be as independent as possible of the control of those whom they are designed to protect.

78-0553. Smith, R. J. ((Author address not given)) **Spraying of herbicides on Mexican marijuana backfires on U.S.** *Science* 199:861-864; 1978.

A program of spraying 2,4,5-T, 2,4-D, and paraquat on marijuana and opium poppy fields in remote areas of Mexico has come under criticism for environmental reasons. Paraquat was initially attractive to Mexican authorities, because it does not persist in the environment but breaks down when it comes in contact with the soil. However, paraquat is extremely toxic: ingestion or inhalation of one-tenth of an ounce can result in death. Paraquat desiccates plant leaves

through a chemical reaction catalyzed by sunlight. If the crop is harvested shortly after spraying, the leaves are removed from the sun and the herbicide remains largely intact. Preliminary results of tests of smoke from marijuana plants treated with paraquat indicate that during smoking the herbicide is broken down into bipyridine, which commonly exists in tobacco smoke and is harmless. Concentrations of paraquat in samples of confiscated marijuana were between 3 and 650 ppm, as compared to Environmental Protection Agency limits for paraquat on foodstuffs in the range of 0.05 to 0.10 ppm.

78-0554. Nag, D. ; Singh, G. C.; Senon, S. (King George Med. Coll., Lucknow, U.P., India) **Epilepsy epidemic due to benzahexachlorine.** *Trop. Geogr. Med.* 29(3):229-232; 1977. (20 references)

Eight cases of grand mal epilepsy in a village in Uttar Pradesh, India, secondary to accidental contamination of food grain by benzene hexachloride (BHC) are reported. Two brothers, 36 and 16 years old, were hospitalized with uncontrolled grand mal seizures despite phenobarbitone 60 mg thrice daily. E.E.G. suggested a seizure disorder; symptoms were confined to the central nervous system. The eight affected members of the patients' family ate wheat; all unaffected members preferred rice. Most of the eight affected persons had persistent brisk reflexes and extensor plantar responses. Wheat was found stored along with a sack containing 10% BHC; less than 0.005% BHC was detected in the wheat. The seizures were imperfectly controlled on therapeutic doses of diazepam and phenobarbitone. Use of diphenylhydantoin with phenobarbitone controlled the seizures.

78-0555. Barthel, E. (Waren-Amsee, E. Germany) **Ergebnisse der respiratorischen Funktionsanalyse bei Pflanzenschutzmittelexponierten in der Landwirtschaft. [Results of respiratory function analyses in agricultural workers exposed to pesticides.]** *Z. Erkr. Atmungsorgane* 147(1): 113; 1977. (German)

The respiratory functions of tractor drivers exposed occupationally to agricultural pesticides were studied during a 2-year period. No temporary exposure-related disturbances of ventilation were found. Both the body plethysmographically determined resistance and FEV_1 were within the normal range. The findings indicate that long-term exposure to pesticides did not cause obstructive ventilatory disorders or chronic bronchitis.

78-0556. Barthel, E. ; Krecklow, K.; Krecklow, B. (Bezirkskrankenhaus Lungenkr. Tuberkulose, Amsee, Waren, 206-DDR) **Ergebrisse der respiratorischen Funktionsanalyse bei Pflanzenschutzmuttel-Exponierten in der Landwirtschaft. [Results of a respiratory function analyses carried out on people exposed to plant protectives in agriculture.]** *Z. Gesamte Hyg. Ihre Grenzgeb.* 23(9): 636-639; 1977. (24 references) (German)

Static and dynamic lung function parameters were monitored in 70 tractor drivers exposed to plant protection agents and 30 controls over a period of 2 yr. Manifest obstructive ventilation disturbances occurred in 7% of both groups tested. There were no significant differences in lung function or incidence of chronic bronchitis, acute respiratory infections, or pulmonary changes detectable by x-ray between the two groups. Since the measurements were performed away from the tractor drivers' occupational environment, it is possible that they experienced obstructive ventilation disturbances while actually exposed to the plant protection agents at work.

78-0557. Ivashina, S. A. ; Poberezkina, D. Ya. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pestic. Polym. Plastics, Kiev, USSR) **Znachenie immunologicheskikh pokazatelei pri issledovanii sostoyaniya zdorov'ya lits na nekotorykh proizvodstvakh. [Significance of immunological indices in the examination of the state of health in persons engaged in some occupations.]** *Zh. Mikrobiol. Epidemiol. Immunobiol.* 9:89-93; 1977. (Russian)

Some humoral, cellular, and barrier immunity indices in healthy persons occupationally exposed to pesticides and grisine, an antibiotic intended for application to animal feeds, revealed changes in various nonspecific immunological reactivity aspects. The changes observed in the indices of the ingestive and digestive function of neutrophils could be interpreted as a compensatory response to chemical agents. Reduced lysozyme content and deep dermal layers of mannitol-splitting and hemolytic microbes indicated initial unfavorable changes in humoral and barrier immunity factors. The immunobiological reactivity indices were sufficiently sensitive and represent possible auxiliary diagnostic tests for conditions caused by chemicals.

78-0558. Shpirt, M. B. (Kirghiz Sci. Res. Inst. Epidemiol. Microbiol. Hyg., USSR) **Dinamika spetsificheskikh immunnykh sdvigov u rabotaiushchikh v kontakte s pestitsidami. [Dynamics of the immunological shifts in workers exposed to pesticides.]** *Zdravookhr. Kirg.* 6: 29-31; 1976. (Russian)

Changes in the specific immunity were studied in 674 sugarbeet growers having short-term exposure to pesticides. Antibodies to DDT, zineb, and BHC were found in 39.8 ± 3.9%, 24.2 ± 3.4% and 16.1 ± 2.9% of all workers, respectively. The frequency of antibodies to DDT was 10.9 ± 1.4% in the unexposed controls, and the figure was 3.8 ± 0.8% for BHC. Antibodies to TMTD (thiram) and carbaryl could not be identified positively in the exposed workers. The incidence of antibodies correlated with the frequency of exposure. The antibody titers to zineb and BHC returned to the initial level nearly one year and 8 months after exposure, respectively. While both the incidences and titers of antibodies to zineb and BHC increased following exposure, the frequency of antibodies to DDT was constant and their titer decreased, because the workers had not been exposed to DDT for 1.5 years. The frequency of antibodies was highest during the first 3 years of exposure. The frequency and intensity of

specific leukocyte agglomeration with the antigens were significantly higher in the exposed group than they were in the controls. The findings indicate a rather high frequency of sensitization following short-term exposure to pesticides, with allergic reactions of the delayed type being prevalent.

78-0559. Al'ber, G. V. (Kirghiz Scientific Research Institute of Epidemiology, Microbiology and Hygiene, USSR) **Gigienicheskaia kharakteristika uslovii truda rabotnikov dezinfektsionnoi sluzhby, kontaktiruiushchikh s pestitsidami. [Hygienic characteristics of the working conditions of disinfection workers exposed to pesticides.]** *Zdravookhr. Kirg.* 2: 38-40; 1976. (Russian)

The working conditions and health status of disinfection and pest control workers exposed to trichlorfon, trichlorometaphos-3, BHC, DDT, zinc phosphide, and ratindan (diphacinone) were studied. The concentrations of organophosphorus pesticides in the air of the respiratory zone in many cases exceeded the MAC by 1.6-2.3 fold. The exposed skin of the hands was contaminated in over 90% of all cases; the pesticide concentrations measured ranged from 0.05 to 0.9 mg/dm^2. The medical examinations of 167 disinfection workers and 62 control subjects revealed pathological changes in the liver in 2/3 of all workers with diseases of the gastrointestinal tract. Reduced Quick test was found in 84.6%. Reduction of the protein synthesizing function of the liver (dysproteinemia and an albumin/globulin ratio of 0.38) was also observed. The hepatic changes and their incidence showed a linear correlation with the length of employment. Disorders of the nervous system were found in 91.1% of the workers, which is 4 times as high as in the controls. Functional changes of the nervous system were seen in about half of these cases. The acetylcholinesterase activity of the blood was 54% lower than in the controls. On the whole, impaired health status was found in 75.6% vs. 50.5% in the controls. Diseases of the gastrointestinal tract, respiratory and cardiovascular systems were most frequent.

See also **78-0503** **78-0515** **78-0570** **78-0573** **78-0586** **78-0606** **78-0611** **78-0645** **78-0676** **78-0677**

78-0560. Nelson, N. (Inst. Environ. Med. Cent., NYU, New York, NY) **Role of interaction of environmental agents in modifying their biological activity.** *Adv. Mod. Toxicol.* 1(Pt. 1): 3-9; 1976. (28 references)

The interaction of environmental substances to perform differential effects (additive, synergistic, and inhibitory) in animals and in humans is discussed, with review of classic cases from the literature as examples of the many possible interactions. The interaction of the pesticide EPN with malathion was discovered to occur at the biochemical level. EPN inhibits carboxyesterase, as aliesterase that detoxifies malathion. The presence of EPN was found to enhance the effect of malathion by reducing the effect of its inactivator, carboxyesterase, when in the same environment. The discovery of the biochemical nature of this additive effect makes it easier to test for similar effects of other pesticides by eliminating time consuming in vivo tests in animals and instead concentrating on the biochemical interactions of the compounds.

78-0561. Gehring, P. J. ; Watanabe, P. G.; Blau, G. E. (Toxicol. Res., Dow Chem. Co., Midland, MI) **Pharmacokinetic studies in evaluation of the toxicological and environmental hazard of chemicals.** *Adv. Mod. Toxicol.* 1(Pt. 1): 195-270; 1976. (79 references)

The basic applications of pharmacokinetics are described in detail. Mathematical derivations for fundamental theories of absorption, concentration, and metabolism for different systems are included. Numerous examples are given of pharmacokinetic studies involving non-drug compounds including the pesticides and related compounds, TCDD, pentachlorophenol, 2,4,5-T, dioxane, and 2,2-dibromo-3-nitrilopropionamide. Statistical parameters for constructing models to estimate the toxicity of these and other chemicals are discussed.

78-0562. Khera, K. S. (Bur. Chem. Safety, Food Direct. Natl. Health, Welfare, Tunney's Pasture, Ottawa, Ontario, Canada) **Distribution, metabolism, and perinatal toxicity of pesticides with reference to food safety evaluation: A review of selected literature.** *Adv. Mod. Toxicol.* 1(Pt. 1): 369-420; 1976. (405 references)

A review is presented of the literature on major studies on pesticides. The metabolic studies in teratogenicity screening for such substances as methylmercury, carbaryl, dioxin, and the carbamates are given. Investigations reporting on the organochlorine group of insecticides, the halogenated benzenes, the carbamates and the phenoxyacid herbicides are listed. Areas of concentration are the distribution, metabolism, perinatal toxicity, and food safety evaluation of these major groups.

78-0563. Kraybill, H. F. (Natl. Cancer Inst., NIH, Bethesda, MD) **Conceptual approaches to the assessment of nonoccupational environmental cancer.** *Adv. Mod. Toxicol.* 3:27-62; 1977. (88 references)

This chapter describes the methodological approaches employed in the assessment of carcinogenic risks for the general population, who receive nonoccupational environmental exposures to various chemicals and other agents. Such evaluations are facilitated either through studies on experimental animals or by means of retrospective and prospective studies of specified human populations. Advances and innovations in the methods of evaluating the carcinogenic potential of a wide array of environmental agents are reviewed. However, the inherent problems in measuring the variability and predictability of carcinogenic activity when work is still going on with biological systems such as animal models or other systems such as cell cultures are great. Experimental data may not allow accurate predictions. There are also situations where the indicators of carcinogenesis in the experimental systems are not verified by observations on the human population. The types of exposures received by the individual from his environment are multiple and thus present a multiple risk. An alternative approach to evaluation of carcinogenic risk would be to consider the combined effect of the environmental chemicals to which humans are exposed. This approach would mean determining, in a suitable test system, the biological response of total extracts and subfractions of extracts of polluted water, polluted air, and contaminated diets.

78-0564. Page, N. P. (Natl. Cancer Inst., NIH, Bethesda, MD) **Concepts of a bioassay program in environmental carcinogenesis.** *Adv. Mod. Toxicol.* 3:87-171; 1977. (128 references)

The concepts of the bioassay program as it relates to environmental carcinogens are reviewed. The current concepts of the program are presented as they pertain primarily to long-term in vivo animal tests with special emphasis on the screening assay for carcinogenicity. Specific areas discussed in the chapter include: a history of the National Cancer Institute carcinogenesis bioassay program, the current National Cancer Institute bioassay program, the economic and scientific considerations in planning for carcinogenesis bioassay tests, the selection of chemicals for testing, methodology of long-term carcinogenesis bioassay tests, objectives of such tests, chemistry procedures, test animals and animal science, experimental design aspects, the use of positive controls, chemical hazards and implications to carcinogen testing program, the reporting and interpretation of test results, and the needs for future research.

78-0565. Burchfield, H. P. ; Storrs, E. E.; Green, E. E. (Gulf South Res. Inst., New Iberia, LA) **Role of analytical chemistry in carcinogenesis studies.** *Adv. Mod. Toxicol.* 3:173-207; 1977. (48 references)

The role of analytical chemistry in carcinogenesis studies is reviewed. Analytical chemistry is important in the identification and measurement of carcinogens in the environment. It can be used for the measurement of persistent compounds in the environment and human tissues, which then can be evaluated for carcinogenicity. Finally, when carcinogens have been identified or persistent compounds have

been demonstrated to be carcinogenic, analytical methods can be used for monitoring the environment for their presence to determine if hazards exist. The two principal roles of analytical chemistry in carcinogenesis studies are to isolate and identify potential carcinogens from environments in which incidence of cancer is high, and to determine if persistent chemicals with widespread distribution in many environments are present that could cancer in humans but at rates too low for epidemiologic detection.

78-0566. Burchfield, H. P. ; Storrs, E. E. (Gulf South Res. Inst., New Iberia, LA) **Organohalogen carcinogens** *Adv. Mod. Toxicol.* 3: 319-371; 1977. (124 references)

On the basis of present knowledge, general conclusions on the carcinogenicity of organohalogen compounds cannot be made. The reasons for the carcinogenicity of chlorinated hydrocarbon insecticides to rodents are completely obscure. Fungicides that contain halogen atoms activated by adjacent quinone, nitrile, nitro, and heterocyclic groups are powerful alkylating agents, and if tested under ideal conditions all of them probably would be mutagenic. Mutagenicity correlates well with carcinogenicity for many groups of compounds, but in the case of the organohalogen compounds such a relationship breaks down. Many organohalogen insecticides are carcinogenic to mice but are not mutagenic when tested by any of the methods currently available. The validity of extrapolating results of tests made on rodents with high doses of chemicals to the environmental and workplace exposure levels of humans is discussed. The most compelling evidence for accepting this relationship is the fact that all chemicals that are known human carcinogens cause cancer in experimental animals. However, it is true that it has not been demonstrated that all chemicals which cause cancer in mice may have the potential of causing cancer in humans.

78-0567. Mertens, H. W. ; Steen, J. A.; Lewis, M. F. (FAA Civ. Aeromed. Inst., Oklahoma City, OK 73125) **The behavioral effects of pesticides: The interaction of mevinphos and atropine in pigeons.** *Aerosp. Med.* 47(2): 137-141; 1976. (31 references)

The interaction between the organophosphate mevinphos and atropine was examined in two pigeons. Atropine sulfate alone was injected intramuscularly in doses of 0.00625, 0.0125, 0.025, 0.05, 0.10, 0.20, and 0.40 mg/kg. Mevinphos, when administered alone, was given in doses of 0.05, 0.10, 0.20, and 0.40 mg/kg. When both atropine and mevinphos were given, atropine was used in doses of 0.0125, 0.25, 0.05, 0.10, 0.20, 0.40, 1.60, and 6.40 mg/kg, and mevinphos was given in doses of 0.20 mg/kg or 0.30 mg/kg. The pigeons performed in a variable interval schedule of reinforcement, in which they were rewarded with a 3 sec access to grain for pecking a key. Responses decreased to an extent depending on dose when either atropine or mevinphos was administered separately. Combined exposure with atropine doses of 0.05 mg/kg and above reduced performance level more than mevinphos alone. Thus use of atropine may increase the harmful effects of organophosphate exposure on behavior, and may by itself seriously impair behavior.

78-0568. Usui, K. ; Shishido, T.; Fukami, J. (Lab. Insect. Toxicol., Inst. Phys. Chem. Res., Wako-Shi, Saitama 351, Japan) **Glutathione S-transferases of rat liver active on organophosphorus triesters** *Agric. Biol. Chem.* 41(12): 2491-2493; 1977. (9 references)

Organophosphorus triesters, *s*-triazines, diphenyl ethers, organothiocyanates, and thiocarbamates are substrates of glutathione (GSH) S-transferases, enzymes which catalyze the conjugation of GSH and are considered to be a contributing factor to selective toxicity and resistance to pesticides. Livers of male JCL:Sprague-Dawley rats were used in assays of the transferase activity, and the final concentration of the substrate and GSH and the pH of the incubation mixture were: methyl parathion-methyl-^{14}C 0.3 m*M*, GSH 5 m*M*, pH 8.0; diazinon 0.3 m*M*, GSH 5 m*M*, pH 6.0; DCNB 0.5 m*M*, GSH 5 m*M*, pH 7.4; and methyl iodide 1.0 m*M*, GSH 2 m*M*, pH 7.4. Five peaks of transferase activity were eluted; the molecular weight of the rat liver transferases estimated by gel filtration was about 43,000. Some organophosphorus triesters, including methyl parathion, parathion, and diazinon, conjugate with GSH at two positions on the molecule: the *O*-alkyl portion and the *O*-*p*-nitrophenyl or *O*-pyrimidinyl moiety. When methyl parathion-methyl-^{14}C and diazinon-ethyl-^{14}C were incubated with three transferases in the presence of GSH, alkyl conjugation took place with a transferase that represented a peak for activity with methyl parathion, and *S*-^{14}C-methyl glutathione and ^{14}C-demethyl methyl parathion were formed as metabolites. Both *S*-methyl glutathione and *S*-*p*-nitrophenyl glutathione were formed with each of the other two transferases. The multiple forms and low and overlapping substrate specificities of GSH S-transferases may enable them to metabolize many foreign compounds.

78-0569. Aliu, Y. O. ; Davis, R. H., Jr.; Camp, B. J.; Kuttler, K. L. (Dep. Physiol. Pharmacol., Fac. Vet. Med., Ahmadu Bello Univ., Zaria, Nigeria) **Absorption, distribution, and excretion of imidocarb dipropionate in sheep.** *Am. J. Vet. Res.* 38(12): 2001-2007; 1977. (19 references)

Spectrophotometric and thin-layer chromatographic methods were used to determine imidocarb in biological samples from sheep that had received imidocarb injections. After intravenous injection of 2.0 mg/kg imidocarb, plasma concentrations in three sheep, which initially averaged 10.8 microgram/ml, decreased within 1 hours to under 1 microgram/ml. Peak plasma concentrations of imidocarb in 7 sheep averaged 7.9 microgram/ml within 4 hours after intramuscular injection of 4.5 mg/kg imidocarb and then rapidly dropped to 4.6 microgram/ml in the following 2 hours. Plasma values then decayed very slowly by first order kinetics. Concentrations of imidocarb in the plasma and the erythrocytes were approximately equal. Detectable amounts remained 4 weeks after imidocarb was administered. Twenty-four hours after imidocarb was administered, the highest imidocarb concentrations were in the kidneys, liver, and brain. Carbon-14 labeled imidocarb was detected in the central nervous system, hypophysis, and pineal body. Within 24 hours, 11 to 17% of the administered dose was excreted in

the urine. After that, excretion was slow, and imidocarb was still detectable in the urine 4 weeks later. Relatively high imidocarb concentration was found in the bile, suggesting that bile is an important route of excretion. Lactating ewes had high concentrations in their milk, but the drug was not detected in plasma of lambs which had been fed milk from the ewes.

78-0570. Ray, A. C. ; Dwyer, J. N.; Fambro, G. W.; Reagor, J. C. (Texas Vet. Med. Diagnostic Lab., Drawer 3040, College Station, TX 77840) **Clinical signs and chemical confirmation of 4-aminopyridine poisoning in horses.** *Am. J. Vet. Res.* 39(2): 329-331; 1977. (14 references)

4-Aminopyridine, a bird repellent, causes birds ingesting it to fly erratically and emit distress calls caused by involuntary contractions of the diaphragm. It kills less than 1% of the birds when used properly. Two adult female quarter horses were exposed to an open sack containing 2 kg of cracked corn which had been prepared by mixing 9 parts of untreated corn with 1 part of cracked corn concentrate containing 1% 4-aminopyridine. Each horse showed signs of fright after eating about 1 kg of the bait, and profuse sweating and severe convulsions followed within 30 min. Depite treatment with xylazine, both horses died 6 to 8 hr after eating the bait. Thin-layer and high-performance liquid chromatographic methods were developed for determining 4-aminopyridine in stomach contents and corn bait. The TLC procedure was capable of detecting amounts as small as 0.5 micrograms. No 4-aminopyridine was found in the livers of the horses. The HPLC method indicated that the corn bait contained 957.9 ppm 4-aminopyridine, and the stomach contents of the two horses contained 88.6 ppm and 160.2 ppm 4-aminopyridine. The estimated lethal dose was between 2 and 3 mg/kg of body weight.

78-0571. Coate, W. B. ; Schoenfisch, W. H.; Lewis, T. R.; Busey, W. M. (Dep. Inhalation Toxicol., Hazleton Labs America Inc., Vienna, VA) **Chronic, inhalation exposure of rats, rabbits, and monkeys to 1,2,4-trichlorobenzene.** *Arch. Environ. Health* 32(6): 249-255; 1977. (19 references)

Inhalation studies were undertaken to assess the toxicity associated with chronic exposure of rats, rabbits, and subhuman primates to 99.07% pure 1,2,4-TCB at concentrations below those expected to be lethal but as high as those expected to produce some pathological sequelae. Exposures were for 7 hours per day, 5 days per week, for 26 consecutive weeks. The nominal exposure concentrations were 25.0, 50.0, and 100.0 ppm. Pulmonary function and operant behavior tests in monkeys, ophthalmoscopic examinations in rabbits and monkeys, and measurements of body weights and hematologic and serum biochemical determinations in all species were conducted. At termination of 1, 3, and 6 months of exposure, microscopic examination of selected rat tissues showed changes in the parenchymal cells of livers and kidneys from all groups of rats exposed to 1,2,4-TCB when sacrificed after 4 or 13 weeks of exposure, but no exposure-related abnormalities or other effects were seen after 26 weeks of exposure in any species.

78-0572. Fassbender, C. P. ; Alvarez, A. R.; Wenzel, S. (Inst. Lebensmittelkd. Fleischhyg. Technol. Tierartzneimittel Hochschule, Hannover, Germany) **Experimentelle Untersuchungen zur Festlgung von geeigneten Probenentnahmestellen fur hexachlorobenzol (HCB)-Rueckstaende bei Mastschweinen. [Establishing suitable sampling sites for HCB residues in fattening pig experimental studies.]** *Arch. Lebensmittelhyg.* 28(6): 201-240; 1977. (9 references) (German)

Forty pigs were used to study transfer of hexachlorobenzene (HCB) to the carcass from the feed. HCB was given at dosages of 0.01, 0.14, and 1.0 mg/kg meal. The untreated meal contained 0.004 ppm. After 12 weeks the pigs were slaughtered, and the HCB residues were determined in belly, back, abdominal, mesentery and perirenal fat, neck and belly muscles, diaphragm, liver and kidneys by gas chromatography. The HCB intake apparently did not adversely affect their growth rate or their health. Residues were significantly higher in liver and kidneys than in fat and muscle samples. Average residues in fat and muscle samples did not differ significantly. Feed is legally permitted to contain up to 0.02 ppm HCB. However, 3.8% of the samples from pigs fed HCB at these levels contained quantiaties of HCB exceeding the maximum permissible level in foods for human consumption, 0.5 ppm.

78-0573. Dobson, K. J. (Dep. Agric. Fish., Adelaide, Australia) **Trichlorfon toxicity in pigs.** *Aust. Vet. J.* 53(3): 115-117; 1977. (4 references)

In November 1974, 25 Large White sows, 6 gilts, and 2 boars were treated for sarcoptic mange using trichlorfon in the feed for 3 days. The amount of treated feed offered was about 2/3 of the amount normally fed. By the second day after the commencement of treatment, signs such as squealing, trembling, a truck-up appearance, a tendency to lie down, falling over, and scouring were seen in the pigs. Eleven sows which were treated during pregnancy farrowed abnormal piglets, all of which died. In a subsequent experiment, Large White pigs were given 50 or 75 mg/kg trichlorfon in the feed for 3 or 5 days. Controls were given no pesticide. After the third or fourth day, pigs given either 50 or 75 mg/kg showed severe appetite depression. Growth rate decreased greatly with higher trichlorfon intake. Clinical signs observed were inappetence, squealing, muscle tremor, and ataxia, followed by death. No salivation or dyspnea were observed. Autopsy revealed congestion of the liver in two animals, and generalized peritonitis and adhesions with necrosis in the small intestine. Plasma cholinesterase levels were severely depressed after 3 days treatment at both levels, and a further 2 days medication increased the depression only marginally. Within 7 days, recovery was nearly complete. Trichlorfon toxicity on the farm may follow overdose resulting from overestimation of live bodyweight, increased intake by animals with larger appetites, use of an inaccurate volumetric measure supplied by the manufacturer, or intake over several days of a dose which should be consumed in a single day.

78-0574. Cummins, L. J. (Pastoral Res. Inst., Hamilton, Victoria, 3300 Australia) **Cow fertility after lice treatment with famphur.** *Aust. Vet. J.* 53(4): 200; 1977. (1 reference)

Twenty-seven cows of different breeds were treated with five applications of 60 ml of 13.2% W/W famphur at fortnightly intervals, the first treatment being applied 1 wk before the start of mating. A control group of 26 animals was left untreated, and the two groups were grazed together except during the 3 hr following treatment of the experimental group. Teaser bulls were used to detect cows in estrus for artificial insemination. In the pesticide-treated group, 13 cows were inseminated in the first 3 wk, and 3 cows did not appear to come into estrus during the entire mating period. In the control group, 15 cows were inseminated during the first 3 wk and 1 animal remained anestrous. In the treated group, 16 cows conceived at first service and 3 more conceived at later services. In the control group, 11 cows conceived at first service, and 7 conceived at later services. The data indicate that, even at the high frequency of application used, famphur had no effect on cow fertility.

78-0575. San Martin de Viale, L. C.; Rios de Molina, M. del C.; Wainstok de Calmanovici, R.; Tomio, J. M. (Dep. Quim. Biol., Fac. Cienc. Exactas y Natur., Univ. Buenos Aires, Buenos Aires Argentina) **Porphyrins and porphrinogen carboxyl-lyase in hexachlorobenzene-induced porphyria.** *Biochem. J.* 168(3): 393-400; 1977. (29 references)

Studies were performed on qualitative and quantitative analysis of the porphyrins present in liver, spleen, kidney, Harderian gland, and erythrocytes of normal and hexachlorobenzene-porphyric rats to determine whether the metabolic disturbances are limited to the liver or affect other organs. The research also studied the porphyrinogen carboxy-lyase activities in these tissues to determine whether the enzyme is acutally affected by hexachlorobenzene, and, if so, in which decarboxylation step the effect is located. Hexachlorobenzene had no effect on erythrocyte porphyrin content, but did produce a decrease in that of Harderian gland and an increase in the porphyrin content of the kidney and spleen, and a marked increase in the liver. Hexachlorobenzene had no effect on the activity of porphyrinogen carboxylyase in erythrocytes. There was a slight decrease in enzyme activity in the Harderian gland, and a marked decrease in the liver and kidney enzyme activities. In the liver the removal of each carboxyl group from uroporphyrinogen III appears to be affected by this treatment. The liver was the principal site of action, with the kidney next in decreasing order of effect. The results are discussed in relation to changes promoted by hexachlorobenzene in other enzymes of the heme pathway.

78-0576. Carlson, G. P. (Dep. Pharmacol. Toxicol., Sch. Pharm. Pharm. Sci., Purdue Univ., W. Lafayette, IN 47907) **Induction of cytochrome P-450 by halogenated benzenes.** *Biochem. Pharmacol.* 27(3): 361-363; 1978. (27 references)

Agents which cause induction of the hepatic microsomal enzyme systems responsible for the metabolism of pesticides and other xenobiotics can be divided into two classes, the phenobarbital type and the benzo(a)pyrene- or 3-methylcholanthrene type, which differ in the spectrum of xenobiotic metabolizing reactions induced and the species of cytochrome P-450 which is increased. The two classes can give additive results when each is given at doses which cause maximal stimulation, but not agents from the same class. It has been reported that administration of the fungicide hexachlorobenzene resulted in a mixed type induction with the peak wavelength for the P-450 measurements at 448.7 nm, findings which apparently conflict with results for other halogenated benzenes. Groups of male Sprague-Dawley rats were given p.o. daily 20 mg/kg of 1,2,4-trichlorobenzene, hexachlorobenzene, or 1,2,4-tribromobenzene or 400 mg/kg of hexabromobenzene in corn oil for 14 days; controls received 0.1% body weight of corn oil; positive controls were given 50 mg/kg, i.p., phenobarbital for 4 days and 2 doses of 40 mg/kg, i.p., 3-methylcholanthrene. In studies of the interactions of enzyme-inducing agents, rats were given either 10 mg/kg of 1,2,4-tribromobenzene or corn oil for 14 days p.o., and half of each group received either phenobarbital for the last 2 days or the 3-methylcholanthrene injections. Groups were compared with controls and each other. The wavelength maximum for the cytochrome P-450 peak was 448.2 nm with 3-methylcholanthree, 449.4 nm with hexabromobenzene, and 450.3 nm with the control and all other substances. The 1,2,4-tribromobenzene treatment and 3-methylcholanthrene treatment both increased azoreductase activity, and the combination resulted in increases which were very close to additive, but there was no additive effect with 1,2,4-tribromobenzene and phenobarbital. The fact that 1,2,4-trichlorobenzene, 1,2,-4-tribromobenzene, and hexachlorobenzene induced species of cytochrome P-450 with a maximum not different from the positive controls indicates that these compounds are inducers of the phenobarbital type. Increases in cytochrome c reductase activity were similar to that for phenobarbital; 3-methylcholanthrene did not increase this activity.

78-0577. Morelli, M. A. ; Nakatsugawa, T. (Dep. Entomol., Coll. Environ. Sci. For., SUNY, Syracuse, NY 13210) **Inactivation in vitro of microsomal oxidases during parathion metabolism.** *Biochem. Pharmacol.* 27(3): 293-299; 1978. (20 references)

The inactivation *in vitro* of microsomal oxidases during parathion metabolism was examined in relation to the binding to the microsomal membrane of sulfur resulting from desulfuration. Modulation of sulfur binding with sulfhydryl compounds revealed that the majority of bound sulfur is unrelated to inactivation. It was concluded that inactivation was related to either the binding of a very small fraction of detected sulfur to a high-affinity component of the oxidase system

or a mechanism other than the binding of a reactive sulfur. (Author abstract by permission)

78-0578. Abdel-Aal, Y. A. I. (Plant Prot. Dep., Coll., Agric., Assiut Univ., Assiut, Egypt) **The role of hydrophobic and electron donor properties in acetylcholinesterase inhibition by carbamates.** *Biochem. Pharmacol.* 26(22): 2187-2189; 1977. (14 references)

The abilities of seven m-substituted phenyl methylcarbamates to inhibit acetylcholinesterases from honey bee and cotton leafworm (*Spodoptera litterolis,* Boisd.) were explored. The extra inhibition bestowed by m-substituted phenyl methylcarbamate as compared with the unsubstituted ($\Delta \log k = \log k(X)/k(H)$) was well correlated with the calculated contribution of each substituent through its hydrophobic and electron donating properties ($0.69\ \pi - 0.96\ \sigma + 1.19$). The correlation coefficient $r = 0.95$ for cotton leafworm acetylcholinesterase and 0.92 for that of honey bee. Analysis of these data, in addition to those of the housefly from the literature, resulted in a direct linear relationship in spite of enzyme source, with $r = 0.91$. It was therefore postulated that hydrophobic interaction and electron donating properties of the substituent were involved in inhibition through complex formation with the enzyme acetylcholinesterase prior to the carbamylation step. (Author abstract by permission)

78-0579. Bunyan, P. J. ; Dilloway, M. R.; Stanley, P. I. (Pest Infest. Control Lab., Minist. Agric. Fish Food, Tolworth, Surbiton, Surrey, England) **The excretion of activity following the administration of 1,1-di(4-chlorophenyl) -2-chloroethylene-ring-UL-^{14}C (^{14}C-DDMU) to Japanese quail.** *Bull. Environ. Contam. Toxicol.* 18(6): 758-765; 1977. (17 references)

^{14}C-1,1,-di(4-chlorophenyl) -2- chloroethylene- ring-UL (^{14}C-DDMU) was administered i.p. (49.97 mg) or orally (44.42 mg) in corn oil to 12-wk-old female Japane quail (*Coturnix coturnix japonica*). The excreta from each bird was collected over each 24-hr period and 15 days after treatment, the quail were sacrificed. Active residues in thefeces and tissues were measured using the plastic bag combustion technique and tissue residues of DDMU were determined by gas-liquid chromatography. During the 4 days following treatment, the birds given DDMU i.p. (birds 1 and 2(excreted 6-9% of the injected dose and the bires treated orally (birds) 3 and 4) excreted 70-78% of the administered dose. Over the entire 15-day period, birds 1 and 2 excreted 61% and 37%, respectively, of the administered dose. Most of the activity in the feces was unchanged DDMU. Birds 1 and 2 accumulated higher residue levels in the tissues than did birds 3 and 4. The liver of birds 3 and 4 contained a residue with the retention time of DDE, although it is unlikely that the residue was DDE. The excretion rate reached a maximum after 8 days, then remained constant.

78-0580. Khorram, S. ; Knight, A. W. (Dep. Land, Air Water Res., Water Sci. Eng. Sect., Univ. Calif., Davis, CA 95616) **The toxicity of kelthane to the grass shrimp (*Crangon franciscorum*).** *Bull. Environ. Contam. Toxicol.* 18(6): 674-682; 1977. (20 references)

Grass shrimp (*Crangon franciscorum*) collected from San Pablo Bay, California were exposed to technical grade Kelthane (dicofol) using standard static bioassay test procedures. Optimum temperature and salinity conditions for maximum *Crangon* survival were maintained. The bioassay data were evaluated by the probit analysis method and all results were corrected for control mortality (7.4% after 48 hr). Kelthane proved highly toxic to *Crangon*, the 24- and 48hr LC50's being 777-2138 and 437-832 ppb, respectively. The lethal threshold Kelthane concentration was approximated at 100 ppb. The loss of Kelthane from the test containers was associated with the presence of the test organisms, suggesting the possibility of bioaccumulation of Kelthane within the organisms. Sublethal effects of Kelthane on *Crangon* were also observed, the shrimp initially responding with high physical activity which decreased until they remained motionless on their backs. Kelthane exposure also resulted in decreased feeding and molting rates.

78-0581. Cardwell, R. D. ; Woelke, C. E.; Carr, M. I.; Sanborn, E. (Wash. Dep. Fish., Pt. Whitney Shellfish Lab., Brinnon, WA 98320) **Appraisal of a reference toxicant for estimating the quality of oyster larvae.** *Bull. Environ. Contam. Toxicol.* 18(6): 719-725; 1977. (18 references)

Dodecyl sodium sulfate (DSS) of the following chain lengths was used as one of three indices of the quality of various lots of larval Pacific oysters (*Crassostrea gigas*): 14% 10-carbon, 72% 12-carbon, and 14% 14-carbon. A modification of the static acute toxicity test method of Woelke (1972) for larval Pacific oysters was used, the modification entailing subsampling of the veliger-stage larvae directly from the test chamber. The biological responses measured after 48-hr toxicant exposure were abnormal shell development (incompletely shelled veliger larvae) and mortality. The relationship between abnormality and mortality of control larvae and sensitivity to DSS appeared to be quite weak. Abnormality and survival of controls were also poorly correlated. The only significant relationship observed was between the time required to induce a given female to spawn and the sensitivity of its progeny to DSS; larvae obtained only after considerable effort to stimulate their release tended to be significantly more sensitive to DSS. It appears that DSS may not in fact be measuring the functional well-being of the oyster larvae, possibly because of the environmentally alien character of this chemical. Thus, although a given chemical may produce rapid and uniform toxicity, it usually can detect only gross differences in test specimen quality. With oyster larvae, such detection would probably be of little value since abnormality and mortality would be unacceptably high. Other suggested reference toxicants have included *p,p'*-DDT, azinphosmethyl, and sodium pentachlorophenate.

78-0582. Lazarov, V.-P. ; Magat, A. (Inst. Vet. Mal. Infect. Parasit., Sofia 13, Bulgaria) **Aspects biochimiques et**

physiopathologiques de l'intoxication aigue et a moyen terme du poulet avec le trichlorfon. [Biochemical and physiopathological aspects of acute and subacute intoxication of chickens with trichlorfon.] *Bull. Soc. Sci. Med. Comp.* 77(2): 89-97; 1975. (39 references) (French)

The biochemical effects of trichlorfon on broilers were studied by administering single high dosages of 40 and 80 mg/kg (acute toxicity) and daily dosages of 5, 10, and 20 mg/kg over a period of 28 days (subacute toxicity). The high dosages caused a notable decrease of serum cholesterinase which at lower levels decreased only slightly. Alkaline phosphatase decreased equally in both cases, and uricemia increased distinctly as a result of acute poisoning. No changes were noted in the levels of electrolytes, serum proteins, or their principal electrophoretic fractions. Acute poisoning led to dyspnea, diarrhea, loss of appetite, salivation, and muscular weakness; in subacute poisoning these symptoms were only very slight. Autopsy revealed no particular lesions of vital organs other than congestion.

78-0583. Ferrando, R.; Truhaut, R.; Gak, J. C.; Graillot, C.; Fourlon, C. (Lab. Nutr. Aliment, Ecol. Nat. Vet. 94701 Alfort, France) **Influences conjugees du taux de proteines du regime et de l'apport de vitamine A sur l'induction du cytochrome P450 par le DDT chez le Rat. [Joint effects of dietary protein level and vitamin A supply on induction of cytochrome P450 by DDT in the rat.]** *C. R. Acad. Sci. Ser. D* 284(23): 2419-2421; 1977. (3 references) (French)

The effects of dietary protein levels (protein from casein, 5 and 15%) and vitamin A supply (25 μg/100 g) on the induction of cytochrome P 450 by DDT (2 x 5 mg/100 g at 3-day intervals, p.o.) were studied in male Wistar rats. During protein deficiency (5% protein in the diet) vitamin A had practically no effect on cytochrome P 450 induction by DDT. In animals treated with 15% protein vitamin A caused a highly significant increase in the cytochrome P 450 level during DDT application. The findings indicate that both adequate protein supply and vitamin A are necessary for cytochrome P 450 induction by DDT; increasing the protein level alone without vitamin A is insufficient.

78-0584. Alam, M. T.; Kasatiya, S. S. (Min. Affaires Sociales du Quebec, Ste-Anne de Bellevue, Quebec, Canada) **Cytological effects of an organic phosphate pesticide on human cells in vitro.** *Can. J. Genet. Cytol.* 18: 665-671; 1976. (14 references)

The radiomimetic effects of guthion (azinphosmethyl) on two lines of human cells, diploid (WI-38) and heteroploid (HEp-2), were studied in vitro. Dosages of 120, 140, and 160 micrograms/ml were used, and they induced chromosome breakage averaging 0.042, 0.058, and 0.165, respectively, per cell in WI-38 cells. Control cells averaged 0.011 breaks per cell. Since guthion inhibits cells from beginning the process of mitosis during guthion treatment, there is a rapid decrease in mitotic cells following treatment at higher dosages. Treating Hp-2 cells with guthion at 140 μg/ml and 160 μg/ml also increased the incidence of chromosomal aberrations; chromatid breaks and exchanges were most common. Failure of condensation, despiralization, secondary constrictions, gaps, dicentric chromosomes, and pulverization occasionally occurred. Previous findings of mutagenic, potentially hazardous effects of guthion were reaffirmed.

78-0585. Fischer, G. W. ; Schneider, P.; Scheufler, H. (Forschungsst. Chem. Toxikol., Akad. Wiss. DDR, DDR-701 Leipzig, DDR) **Mutagenicity of dichloroacetaldehyde and methyl-2,2-dichloro- 1,1-dihydroxyethane phosphonate, possible trichlorfon metabolites.** *Chem. Biol. Interact.* 19(2): 205-213; 1977. (34 references) (German)

Studies were performed to assess the mutagenicity of dichloroacetaldehyde and methyl-2,2- dichloro-1,1- dihydroxyethanephosphonate, which are formed solvolytically from desmethyltrichlorphone. The latter is an in vivo metabolite of the organophosphorus pesticide trichlorfon. The two test compounds showed a mutagenic activity comparable with that of trichlorfon. The findings of this study suggest that the genetic effects of this pesticide may in fact be due to the action of its degradation products.

78-0586. Anonymous **Can it rid body of other toxins?** *Chem. Week* 122(9):30; 1978.

An experimental drug treatment for victims of Kepone (chlordecone) poisoning may aid people whose systems contain other halogenated hydrocarbons in dangerous amounts. The other hydrocarbons include polychlorinated biphenyls (PCBs), polybrominated biphenyls (PBBs), mirex, aldrin, dieldrin, and DDT, which usually enter the systems of humans and animals through the food chain. Although the levels of these chemicals in the general population are likely to be a good deal lower than Kepone levels in exposed workers, the principle for removing them is believed to be similar. Kepone is normally excreted with the bile; some of it leaves the body through the stools, but much of the Kepone entering the intestine is reabsorbed with the bile salts. Experiments were performed with a variety of binding agents to prevent bile salts from being reabsorbed. It was found that cholestyramine could also bind to Kepone. Other chemicals may not be removed by this treatment, since presumably other common halogenated hydrocarbons enter the intestine by way of the blood.

78-0587. Berry, J. D. ; Stotter, D. A. (Dep. Chem., Univ. Essex, Wivenhoe Park, Colchester, CO4 3SQ, Essex, England) **Dechlorination of DDT by vitamin B_{12} under mildly reducing conditions.** *Chemosphere* 11:783-787; 1977. (19 references)

Aliquots of a 280 micromolar solution of solubilized DDT were incubated for 16 hr at 37° in air or carbon monoxide with hydroxycob(III)alamin in the presence or absence of light from a tungsten lamp. When both vitamin B_{12} and CO were present, all of the DDT was converted to DDD (TDE); when only one was present, none of the DDT was

converted. These results occurred in both light and dark conditions.

78-0588. Richardson, J. T. (Univ. Arkansas, Fayetteville, AR 72701) **The effects of fluometuron, MSMA, metribuzin, and glyphosate on *Euglena gracilis*.** *Diss. Abstr. Int. B.* 38(5): 1985-1986; 1977.

The effects of fluometuron, MSMA, glyphosate, and metribuzin on a *Euglena gracilis* strain were investigated. *Euglena* cell counts were inhibited by 65% or more from fluometuron levels above 40 μM. Glyphosate and metribuzin exhibited some decreases in cell number yet were inconsistent in their effects. MSMA at 600 μM gave 42% reduction in cell number after 144 hours exposure. Chlorophyll content was reduced 36 to 80% by metribuzin levels of 2 μM or greater. Fluometuron also inhibited chlorophyll content by 30% or more from 4 μM or greater concentrations. Glyphosate exhibited 21 to 69% reduction in chlorophyll at the 3mM level. MSMA had no effect. Photosynthesis was significantly altered by fluometuron and metribuzin at all levels tested. At levels above .9 μM metribuzin and 90 μM fluometuron, photosynthesis was reduced by 50% or more. Glyphosphate showed reductions of photosynthesis at levels below .12 μM and some stimulation above this level. (Author abstract by permission, abridged. Copies of the thesis are available from University Microflims, order No. 77-23,357).

78-0589. Schoeny, R. S. (Univ. Cincinnati, Cincinnati, OH) **Bacterial mutagenesis and liver activation in the assessment of carcinogens.** *Diss. Abstr. Int. B.* 38(5):2036-2037; 1977.

A rapid screening assay for mutagenesis employs strains of *Salmonella typhimurium* made auxotrophic for histidine by either missense or frameshift mutations in the structural genes for histidine biosynthesis. One of these strains is plated in the presence of growth-limiting histidine, which permits only those organisms reverted to histidine independence to give rise to colonies. The compound to be tested is added to the plate bearing test bacteria dnd mutagenicity is scored as the increase in number of histidine-independent colonies. Precarcinogens which require mammalian metabolism for their activation can be detected as bacterial mutagens upon the addition to the plate assay of rat liver microsomal systems. In the present study 2-aminoanthracene (2AA), benzo(a)-pyrene (BAP), and aflatoxin B_1 (AFB) were used in activation assays as examples of three pre-mutagens requiring different enzymatic pathways for metabolism to mutagenic forms. The carcinogen-activation potentials of variously induced and uninduced microsomal extracts (S-9), were compared. Phenobarbital (B) and 3-methylcholanthrene (3MC) induced S-9s exhibit complementary patterns of carcinogen activation potentials. 2AA and AFB exhibit sharp PCB-induced S-9 concentration maxima. Chlorinated hydrocarbons which are metabolized rapidly (1,2,4-trichlorobenzene) or slowly (chlordecone, mirex), while not mutagenic in themselves, could affect mutagenesis of other compounds by their effects on liver metabolism as a result of pretreatment of the animal. Only induction by PCB promoted BAP mutagenesis.

78-0590. Roth, R. N. (Albany Med. Coll., Union Univ., Albany, NY) **The correlation between morphological appearance and biological behavior of proliferative hepatic nodules in the mouse.** *Diss. Abstr. Int. B.* 38(5): 2128; 1977.

Groups consisting of 100 male and 100 female mice (Charles River, CD-1 strain) were fed either Dieldrin or Mirex in the diet in concentrations ranging from 0.05 to 30.0 ppm. Five hundred and ninety-five males and five hundred and ninety-five females were used as controls. Groups of animals were sacrificed at various time intervals ranging from two to twenty-five months. The initial changes consisted of various degrees of centrilobular and pericentral hypertrophy. These changes were later associated with the appearance of hepatic nodules whose occurrence was time- and dose-related. These nodules consisted of hypertrophic hepatocytes, which in a few instances were mixed with hyperplastic cells. Lung metastases were observed in three animals which had hypertrophic hepatic nodules (15 ppm Dieldrin for 25 months), indicating that these Dieldrin-induced nodules had to be regarded as hepatocellular carcinomas. No metastases were seen in the Mirex-exposed animals which had hepatic nodules. The morphology of the hepatic nodules induced by Dieldrin and Mirex did not allow the differentiation between those that metastasize and those that did not. Quantification of the nuclear, cytoplasmic, Kupffer cell and blood vessel volumes of nodules in either Mirex or Dieldrin fed animals revealed no differences in those nodules that metastasize and those that did not. Those nodules associated with lung metastases had up to a tenfold increase in the surface area of reticulum fibers. Nodules associated with lung metastases also exhibited acinar formation in conjunction with loss of cohesion. These acini were not observed in hepatic nodules in which loss of cohesion occurred but no lung metastases were observed. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 77-237 436)

78-0591. Auwarter, A. G. (Univ. Georgia, Athens, GA) **Some effects of toxaphene-methyl parathion interaction on Bluegill Sunfish (*Lepomis macrochirus*, Rafinesque).** *Diss. Abstr. Int. B.* 38(7): 3061; 1978.

An intermittent-flow proportional diluting system capable of producing sixteen combinations of four levels of each of two toxicants is being used to study some acute and chronic effects of toxaphene and methyl parathion mixtures. Acute studies, run at 25-100% of the experimentally determined 48-hour LC50's for each pesticide, showed a significantly ($P < 0.01$) antagonistic effect on short-term bluegill sunfish survival. Where significant interaction was shown for short-term pesticide accumulation, this also was antagonistic. Chronic studies (1-4% of 48-hour LC50's) revealed that synergistic interaction developed after 42 days of exposure. Methyl parathion as a main effect produced a significant ($P < 0.05$) synergistic effect on toxaphene accumulation in bluegill; toxaphene as a main effect has no effect on methyl parathion accumulation. After 42 days of exposure, a highly significant ($P < 0.01$) toxaphene methyl parathion interaction synergistically affects both toxaphene and methyl pa-

rathion levels in fish. Cytochrome P450 levels in fish are also synergistically affected by the pesticide mixtures within 42 days. Low cytochrome P450 levels in fish are also synergistically affected by the pesticide mixtures within 42 days. Low cytochrome P450 levels correspond with high pesticide levels in the bluegill after 42 days exposure to 60 ppb methyl parathion and 0.14 ppb toxaphene, suggesting a possible deactivation of the P450 system, destruction of existing P450, or a decrease in specific activity of the enzyme. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 77-29,738)

78-0592. Lee, H. (Cornell Univ., Ithaca, NY) **The development of hypothalamic testosterone and estradiol binding proteins and effects of neonatal administration of *o,p'*-DDT on sexual differentiation of the brain in rats.** *Diss. Abstr. Int. B.* 38(7): 3067; 1978.

Administration of *o,p'*-DDT to newborn male rats interfered with the sexual differentiation of the brain. This interference is characterized by the capacity to form corpora hemorrhagica and corpora lutea in implanted immature ovarian tissue. Such interference is suggested to be due primarily to the inhibitory effect of *o,p'*-DDT on the binding of both estradiol and testosterone to their specific receptors in the hypothalamus during the period of hypothalamic receptor development, which is also the critical hypothalamic sexual differentiation period. Therefore, the normal development of hypothalamic receptors for testosterone and estradiol, as well as the normal function of the hormone-receptor complexes, may be modified by the hydrocarbon pesticide. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 77-28,361)

78-0593. Muska, C. F. (Oregon State Univ., Corvallis, OR) **Evaluation of an approach for studying the quantitative responses of whole organisms to mixtures of environmental toxicants.** *Diss. Abstr. Int. B.* 38(7): 3107-3108; 1978.

An approach previously proposed for studying the effects of mixtures of environmental toxicants on the quantal (all or none) responses of whole organisms was evaluated in terms of its applicability to quantitative (graded) response studies. Four types of multiple toxicity were defined respectively as concentration, response, supra- and infra-addition. Hypothetical dose response curves and their respective isobole diagrams were used to illustrate the relationships between the types of toxicant interaction discussed. Growth was selected as the quantitative response for study in order to empirically evaluate the proposed approach. The effects of copper, nickel, and dieldrin and selected mixtures of these compounds on the relative growth and food consumption rates of juvenile guppies (*Poecilia reticulata*) fed a restricted and an unrestricted ration of tubificid worms were expressed as a function of the natural logarithm of toxicant concentration. The resulting dose response curves for binary mixtures of copper-nickel and dieldrin-nickel were compared to curves predicted on the basis of the previously mentioned types of toxicant interaction. Mixtures of copper and nickel appeared to be either concentration additive or slightly supra-additive depending upon the defined response under consideration. The results of the dieldrin-nickel study were inconclusive regarding the determination of the nature of the interaction for mixtures of these toxicants. Possible reasons for the difficulties encountered in interpreting the results of the dieldrin-nickel studies are discussed. The proposed approach appears to provide a useful frame of reference for empirically describing the combined effects of multiple toxicants on the performances of whole organisms. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 77-29,421)

78-0594. Olson, K. L. (Univ. Wisconsin, Madison, WI). **Effects of chronic pre-and postnatal exposure to pesticides on the behavior and learning ability in rats.** *Diss. Abstr. Int. B.* 38(7): 3108; 1978.

Pesticides of environmental concern (dieldrin, chlordimeform, toxaphene, and two fractions of toxaphene, Toxicant A and Toxican B) were fed to two generations of albino rats. The rats received daily oral doses of either 0.35 μg/kg dieldrin, 100 μg/kg chlordimeform, 50 μg/kg toxaphene, 2 μg/kg Toxicant A, or 2 μg/kg Toxicant B. Second generation animals were tested in a variety of maturational, motivational and learning tasks. The results revealed that the rats fed toxaphene, Toxicant A, Toxicant B, and chlordimeform were significantly inferior to the controls in overall swimming ability (a maturational task). The Toxicant B group was inferior to the controls, the Toxicant A group and toxaphene group in learning ability (i.e., the number of mistakes made on the test problems). The Toxicant A fed animals were inferior to the other groups in retention testing which involved running the animals on the same problem 48 hours later. Toxicant A rats made significantly more errors and had the worst total time for the trials. Early deficits in righting reflex ability were exhibited in the toxaphene rats. The dieldrin groups were significantly superior to their control groups in the retention test, thus suggesting a stimulatory effect of low dose dieldrin. In other experiments ingestion of higher levels of dieldrin resulted in behavioral impairment. (Author abstract by permission, abridged. Copies of the thesis are available from University Microfilms, order No. 77-19,724)

78-0595. Skryabin, G. K. ; Golovleva, L. A.; Zyakun, A. M.; Pertsova, R. N.; Shurukhin, Yu. V. (Inst. Biochem. Physiol. Microorg., USSR Acad. Sci., Pushchino Moskovskoi obl., USSR) **Degradatsiia DDT v feniluksusnuiu kislotu kul'turoi *Pseudomonas* sp. 640x. [Degradation of DDT into phenylacetic acid by *Pseudomonas* sp. 640x culture.]** *Dokl. Akad. Nauk SSSR* 237(5): 1212-1215; 1977. (11 references) (Russian)

The degradation of DDT (50 mg/liter) was studied in *Pseudomonas* sp. 640x culture in the presence of different co-substrates. The metabolites were identified by gas chromatography - mass spectrometry. DDE and bis-(4- chlorophenyl)acetic acid were identified in the cultures in the presence

of octane, hexane, sodium butyrate and glucose. More complete degradation of DDT was observed in the presence of hexadecane: *p,p*-dichlorobenzohydrole and *p,p*-dichlorodiphenyl methane were found after culturing for 1 month, and phenylacetic acid was prevalent among the metabolites found at the end of the 2nd month. At that time 50% of the input quantity was found in the form of phenylacetic acid, 10% as DDE, and 40% remained as intact DDT. The findings indicate the degradation of DDT to chlorine-free metabolite (phenylacetic acid) by *Pseudomonas* sp. 640x in the presence of hexadecane.

78-0596. Egle, J. L., Jr. ; Fernandez, S. B.; Guzelian, P. S.; Borzelleca, J. F. (Dep. Pharmacol. Med., Med. Coll. Virginia, Va. Commonwealth Univ., Richmond, VA) **Distribution and excretion of chlordecone (kepone) in the rat.** *Drug Metab. Dispos.* 6(1): 91-95; 1978. (19 references)

Male Sprague-Dawley rats received a single 40 mg/kg dose of ^{14}C-labeled chlordecone in a corn-oil solution by stomach tube. On day 1, ^{14}C-chlordecone distribution ranged from 253 units in the adrenal gland to 8.38 units in the blood. After 3 days, levels ranged from 198 units in the liver to 6.35 units in the blood. After 182 days, levels ranged from 3.57 units in the liver to 0.03 units in the blood. Half-lives in the blood were 8.5 days during the first 4 weeks, approximately 24 days during the next 8 weeks, and 45 days during the following 14 weeks. Levels in most tissues declined at a similar rate. The ratio of concentrations in liver to concentrations in blood increased from 28:1 on day 1 to 126:1 on day 84. 12.7% of the radioactive chlordecone was excreted in the feces during the first 24 hr, 2.9% during the second 24 hr, and 3.3% during the third 24 hr. At the end of the first week 29.5% had been excreted in the feces. The rate of excretion then declined steadily; by the 12th week, only about 0.15% of the dose was excreted per day. At the end of 12 weeks a total of 65.5% had been excreted in the feces, and after 182 days the total excretion was 69.8%. 0.533% of the dose was excreted in the urine during the first 24 hr. During the first 7 days, a total of 0.7% was excreted in the urine, and the total urinary excretion by 84 days was only 1.6%.

78-0597. Reuber, M. D. (NCI Frederick Cancer Res. Ctr., Frederick, MD) **Carcinomas, sarcomas and other lesions in Osborne-Mendel rats ingesting endrin.** *Exp. Cell Biol.* 46(3): 129-145; 1978. (23 references)

Osborne-Mendel rats were fed 0.1, 1.0, 5, 10, or 25 ppm endrin in the diet. Thirteen of 16 male rats ingesting 0.1 ppm endrin developed malignant tumors, compared to none of the 15 rats not ingesting endrin. When male rats ingested 1, 10, or 25 ppm endrin, one-fourth to one-half of them developed tumors. Twenty of 22 female rats ingesting 0.1 ppm endrin and 22 of 23 female rats ingesting 1 ppm endrin developed malignant tumors. Half to three-fourths of female rats ingesting 5, 10, or 25 ppm endrin and 9 of 23 controls also had tumors. The most common sites of sarcomas in male rats were the lymph node and the mammary gland, and the most common site for carcinomas in male rats and sarcomas and carcinomas in female rats was the mammary gland. Five of 16 male rats and 7 of 23 female rats ingesting 0.1 ppm endrin had hyperplastic nodules or malignant tumors of the liver. None of the control rats had either hyperplastic nodules or malignant tumors of the liver. Hyperplastic nodules and malignant liver tumors occurred in small numbers in rats ingesting 10 or 25 ppm endrin. Male rats developed an increased incidence and severity of chronic renal disease related to the dosage, except for rats ingesting 5 ppm endrin.

78-0598. Bollag, J.-M. ; Sjoblad, R. D.; Minard, R. D. (Dep., Agron., Dep. Chem., Pennsylvania State Univ., University Park, PA 16802) **Polymerization of phenolic intermediates of pesticides by a fungal enzyme.** *Experientia* 33(12): 1564-1566; 1977. (7 references)

The fungus *Rhizoctonia praticola* produces an extracellular phenol oxidase (laccase) which polymerizes phenolic intermediates of various pesticides. The enzyme catalyzes the formation of oligomeric products from halogenated phenolic intermediates of phenoxyalkanoate herbicides and from naphtholic products derived from carbamate insecticides. These findings permit further investigations into the mechanism and role of oxidative coupling leading to the incorporation of xenobiotic compounds into soil organic matter. (Author abstract by permission)

78-0599. Pipy, B. ; Beraud, M.; Gaillard, D. (Groupe Recherch. Toxicolog. Aliments Boissons, INSERM - U.87, Inst. Physiol., F-31400 Toulouse, France) **Phagocytic activity of the reticuloendothelial system in the rat after administration of an anticholinesterasic pesticide, carbaryl** *Experientia* 34(1): 87-88; 1978. (10 references) (French)

The effects of 4 carbaryl doses (0.375, 0.75, 1.50 and 3 mg/100 g) on the reticuloendothelial system (RES) phagocytic activity were studied 1 h after their administration to male rats. Carbaryl reduced RES phagocytic activity. Results showed a dose-dependent drop in RES phagocytic activity. Carbaryl might act as an inhibitor of phagocytes by saturing them to greater or lesser degree, depending on the dose administered. (Author abstract by permission)

78-0600. Zeyer, J. ; Bodmer, J.; Huetter, R. (Microbiol. Inst., ETH-Zentrum, CH-8092 Zurich, Switzerland) **Microbial degradation of triazine herbicides.** *Experientia* 33(12): 1687-1688; 1977.

A program was started to search for microorganisms which could degrade certain s-triazines and their derivatives, especially the hydroxy derivatives. Microbial strains were isolated from samples of soil treated with triazine herbicides over many years, and from sewage plants from triazine production. The metabolic capabilities were investigated with ^{14}C-ring labelled s-triazines which were added to the growth medium at a concentration of 5 ppm. After fixed times of incubation samples were taken from the supernatant and were analyzed by thin layer chromatography, followed by autoradiography. In the case of cyanuric acid, the amount

of $^{14}CO_2$ formed was measured. Microorganisms capable of the following degradations were found: *N*-ethylammeline to *N*-ethylammelide, *N*-isopropylammeline to *N*-isopropylammelide, ammeline to ammelide, ammelide to cyanuric acid, cyanuric acid to CO_2 and presumably NH_3. Although deakylations of OH-atrazine, *N*-isopropylammeline, *N*-isopropylammelide, *N*-ethylammeline or *N*-ethylammelide could not be performed, dealkylations with atrazine were observed. With the dealkylated OH-forms, deaminations could be performed and cyanuric acid could be degraded efficiently. (Author abstract by permission, abridged)

78-0601. Carlson, G. P. (Dep. Pharmacol. Toxicol., Sch. Pharm. Pharm. Sci., Purdue Univ., W. Lafayette, IN 47907) **Chlorinated benzene induction of hepatic porphyria.** *Experientia* 33(12): 1627-1629; 1977. (17 references)

1,4-Dichlorobenzene and 1,2,4-trichlorobenzene were compared with hexachlorobenzene which is known to cause porphyria. Although hexachlorobenzene administration resulted in a manyfold increase in liver porphyrin levels and urinary excretion of porphyrins when tested in rats, the lesser chlorinated compounds did not do so. (Author abstract by permission)

78-0602. Cooper, P. (Author address not given) **Hepatotoxic ANIT.** *Food Cosmet. Toxicol.* 15(5): 484-485; 1977.

α-Naphthylisothiocyanate (ANIT), a compound with insecticidal properties, produces bilirubin retention and reduced bile flow in mammals. Histological studies showed that 24 hr after mice were given an oral dose of 100 milligrams ANIT/kg, intrahepatic bile ducts were denuded of epithelium and their lumens were filled with debris, while the adjacent parenchyma was necrotic. A single oral dose of 100 milligrams/kg ANIT was followed in rats by an increase in conjugated bilirubinemia, which reached a peak at 48 hr and had subsided by day 7. It seems that cycloheximide, actinomycin D, and DL-ethionine probably suppress the development of hyperbilirubinemia and cholestasis by inhibiting the formation of a toxic ANIT metabolite. Female rats that had been fed 0.1% ANIT in the diet for 6-14 days showed increased excretion of free ethionine and particularly of S-adenosylethionine at the expense of total ethionine sulfoxide. When rats were given 200 milligrams ANIT/kg by gavage, bile flow was not significantly reduced during the first 12 hr, but stasis was complete by 24 hr and was completely reversed 7 days later. (Author abstract reprinted by permission)

78-0603. Chikalo, N. A. ; Pavlenko, V. F. (Ukrainian Scientific Research Institute of Horticulture, USSR) **Deistvie gerbitsidov na mikrofloru erodirovannykh pochv v sadakh. [Effect of herbicides on the microflora of eroded garden soils.]** *Khim. Sel'sk. Khoz.* 15(9): 61-65; 1977. (34 references) (Russian)

The effects of simazine (6 kg/ha in the first year, 3 or 6 kg/ha in the following years), or of simazine (6 kg/ha) + dalapon (10 kg/ha) during the first year, with simazine (3 kg/ha) in the second year and 2,4-D (2 kg/ha) in the third, on the soil microflora were studied in eroded garden soil (slightly loamy soil, pH 5.1-5.8, humus content in upper 20 cm layer 0.7%). The herbicides inhibited practically all types of soil microorganisms, and caused shifts in their composition. The inhibiting effect was most pronounced in soils treated with 6 and 3 kg/ha doses of simazine alternately. The herbicides have only a negligible effect on microorganisms assimilating organic nitrogen during the second year, and they even stimulated them during the third year. However, this was followed by inhibition during the fourth and fifth years. The activity of the denitrifying bacteria was increased in all years, which was partly due to the slightly increased nitrate level and compactness of the soil. Microorganisms degrading organic phosphorus compounds were also inhibited. The herbicides decreased the populations of *Trichoderma* and *Lyghorynchus* species, and stimulated the growth of *Fusarium* species.

78-0604. Moroi, K. ; Kuga, T. (Dep. Exp. Pharmacol., Res. Inst. Chemobiodynamics, Chiba Univ., Narashino 275, Japan) **Liver arylamidase inhibition by tetrachlorvinphos and interactions with tricresylphosphate and bis *p*-nitrophenylphosphate** *Jpn. J. Pharmacol.* 27(Suppl): 84P; 1977.

The dose of tetrachlorvinphos (TCVP), a vinyl phosphate insecticide, required for 50% inhibition of isocarboxazid hydrolase (ISOCase) in rats was 40 mg/kg, but complete inhibition of ISOCase activity was not observed even in rats given 1000 mg/kg of TCVP. At a dosage of 60 mg/kg the activity of ISOCase returned to normal within 24 hr. A single dose of 1000 mg/kg TCVP activated ISOCase to 130% of control at day 3 and 185% of control at day 5. When doses of 60 and 250 mg/kg TCVP were repeated for 10 days, activities of ISOCase and brain ChE were inhibited the first day, but ChE activities did not decrease further in the next 9 days. ISOCase activity also returned to normal on day 5. Pretreatment with low doses of tricresylphosphate (TOCP) and bis *p*-nitrophenylphosphate (BNPP), which almost completely inhibited ISOCase activity without inhibition of ChE, did not potentiate the inhibition of brain ChE by TCVP. Apparently ISOCase is not important in detoxifying TCVP which binds to the arylamidase in rats.

78-0605. Cooper, P. (Author address not given) **Dioxin: a new biological probe?** *Food Cosmet. Toxicol.* 15(5): 481-483; 1977.

Dioxin, or 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (TCDD), is reputed to be one of the most highly toxic compounds known. Dioxin sometimes induces delayed effects. Mice fed 250 micrograms TCDD/kg and rats fed 200 micrograms TCDD/kg developed liver damage, including necrosis, in experimental studies. Doses of 10 micrograms TCDD/kg ip or 200 micrograms/kg orally did not significantly effect DNA synthesis when 70% hepatectomy was used to stimulate mitosis in rats, but did depress DNA synthesis nearly

50% when mitosis was stimulated by folic acid or lead acetate. In rats fed [14C]TCDD at a dietary level of 7 or 20 ppb for 42 days, tissue TCDD concentrations were highest in the liver, and rates of residue elimination from males and females gave half-lives of 12 and 15 days respectively. Rats given [14C]TCDD in a single oral doses of 1 microgram/kg showed radioactivity in the feces but not in the urine or expired air; when doses of 0.01-1 microgram/kg/day were given on 5 days/week for 7 weeks, a significant amount of activity also appeared in the urine. Various studies support the view that TCDD possesses unique toxicological features. TCDD are strongly reminiscent of the lesion seen in neonatal hepatitis, a disease induced by the infectious hepatitis virus.

78-0606. Popov. T. A. (All-Union Sci. Res. Inst. Hyg. Toxicol. Pestic., Polymers and Plastic Materials, Kiev, USSR) **Znachenie oksidaz smeshannoi funktsii pecheni dlia resheniia nekotorykh aktual'nykh problem gigienicheskoi toksikologii. [Significance of hepatic mixed-function oxidases for the solution of some problems of current interest in hygienic toxicology.]** *Gig. Sanit.* (10): 23-27; 1977. (19 references) (Russian)

A new method was developed for determining the activity of hepatic mixed-function oxidases (MFO) by analyzing the principal urinary metabolites of orally administered aminopyrine. This method was examined in terms of its suitability for assessment of liver function in experimentally poisoned outbred male rats and in 45 workers occupationally exposed to pesticides. The rats were treated with daily oral doses of dursban (chlorpyrifos, 1 or 5 mg/kg) for up to 60 days. Dursban caused an initial slowdown, then an acceleration of the hepatic biotransformation processes. The MFO activity increased during the first 15 days. Dealkylation of the P-O analog of dursban and of dursban proper was observed between the 30th and 60th days. The findings indicate that rearrangement of the biotransformation pathways of dursban is one of the mechanisms of adaptation of the warm-blooded organism to this substance. It was possible to diagnose disturbances in the liver function in all 45 workers exposed to zineb or organochlorine and organophosphorus pesticides by the MFO test, while the clinical and laboratory examinations revealed no pathological changes in 14 persons.

78-0607. Kasymov, R. A. (Uzbek Sci. Res. Inst. Sanit. Hyg. Occup. Dis., Tashkent, USSR) **Vliianie insektitsida bazudina i vysokoi temperatury na aktivnost' makrosomal'nykh [*sic*] fermentov. [Influence of diazinon and high temperature on the activity of microsomal enzymes.]** *Gig. Sanit.* (10): 91-92; 1977. (4 references) (Russian)

The effects of inhaled diazinon, high temperatures (35-36°C), and a combination of the two on the relative weight of the liver, the microsomal protein level, and the microsomal cytochrome P-450 and cytochrome B_5 levels were studied in rats. In the first series, the animals exposed to high temperatures inhaled diazinon in concentrations of 0.110, 0.049, and 0.011 mg/m³ for 4 x 15 days at 15-day intervals. The animals in series 2, exposed to normal temperature, inhaled air with diazinon concentrations of 0.210, 0.047 and 0.0105 mg/m³ for 3 months. The relative weight of the liver and the microsomal protein level showed a tendency to increase in the groups exposed to the highest concentrations in the first series; the differences from the controls were not significant. The cytochrome P-450 levels showed a significant decrease in the groups exposed to 0.110 and 0.049 mg/m³ in series 1 (0.467 and 0.511 μmol/mg, respectively, vs. 0.676 μmol/mg in the controls exposed to high temperature only), and in the groups exposed to 0.210 and 0.047 mg/m³ in series 2 (0.700 and 0.780 μmol/mg vs. 0.908 μmol/mg in the controls). The cytochrome B_5 level showed a significant reduction only in the group exposed to 0.210 mg/m³ in series 2 (0.567 μmol/mg vs. 0.720 μmol/mg in the controls).

78-0608. Sasinovich, L. M. ; Ovsyannikova, L. M.; Badaeva, L. N. (Inst. Hyg. Toxicol. Pestic. Polym. Plastics, Kiev, USSR) **Osobennosti kozhno-rezorbtivnogo deistviya novykh pestitsidov, otnosyashchikhsya k razlichnym khimicheskim gruppam. [Features specific for the skin-resorptive action of new pesticides belonging to different chemical groups.]** *Gig. Tr. Prof. Zabol.* 7: 34-36; 1977. (Russian)

Thirty-six new pesticides of different chemical groups were studied with regard to their action when applied to the skin of rats, rabbits, and guinea pigs. Investigations involved single doses of 2000 mg/kg and a series of 20 applications of 100 mg/kg. Effects were evaluated on the basis of mortality and changes in a number of physiological, biochemical, and patho-histological factors. Organophosphorus pesticides, such as phosvel, acaricide 228F, cyanox, and bromophos proved most toxic. The nature of the changes following their application indicated a central nervous system lesion and acute inflammation, especially in the liver. The effects of organochlorine pesticides included significantly disturbed functions and structure of the kidneys and liver. Localization of the inflammation in the kidneys characterized the effects of carbamic and dithiocarbamic acids. Applying compounds containing the nitro group to the skin resulted in indications that the hemopoietic system was affected.

78-0609. Mukhtarova, N. D. (Inst. Hyg. Toxicol. of Pestic., Polymers and Plastic Materials, Kiev, USSR) **K metodike diagnostiki gipotalamicheskogo sindroma u lits s allergozami khimicheskoi etiologii. [Method of diagnosis of hypothalamic syndrome in persons with allergosis of chemical etiology.]** *Gig. Tr. Prof. Zabol.* 10: 45-47; 1977. (5 references) (Russian)

A new method for diagnosing hypothalamic pathology of allergic etiology is described. The hypothalamic syndrome is diagnosed by the nasal hypothalamic provocation test, comprising inserting a turunda containing the test allergen, e.g., a pesticide, pollen, bacteria or dust, into one nostril, and another turunda containing the vehicle or solvent only into the other. The hypothalamic syndrome is diagnosed on the basis of changes in clinical, neurophysiological and immunological parameters compared with the initial values. The test revealed hypothalamic syndrome in 90.2% of 87

sensitized patients, while allergen tests of other localizations in the same patients were negative. Negative tests were obtained for all non-allergic control subjects. The specific test is also suitable for preclinical diagnosis of the sensitization of hypothalamic structures.

78-0610. Yamamoto, S. (Dep. Dermatol., Hiroshima Univ. Sch. Med., Hiroshima, Japan) **Inhibition of histamine release by diisopropylfluorophosphate in human cutaneous anaphylaxis.** *Hiroshima J. Med. Sci.* 26(2-3): 173-175; 1977. (9 references)

The addition of diisopropylfluorophosphate (DFP) to incubation mixtures of human skin caused an inhibition of the allergic histamine release response in five out of seven samples tested. The inhibition of the IgE-mediated response was found to be dose-dependent, and results suggest that a diisopropylfluorophosphate-sensitive esterase may be partly responsible for the histamine release which accompanies allergic reactions.

78-0611. Some fumigants, the herbicides 2,4-D and 2,4,5-T, chlorinated dibenzodioxins and miscellaneous industrial chemicals *IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Vol. 15.* 354 p.; 1977. (816 references)

These monographs summarize the evidence for the carcinogenicity of individual chemicals and other relevant information on the basis of data compiled, reviewed and evaluated by a Working Group of experts. The various substances discussed in these particular monographs include 1,2-bis(chloromethoxy)ethane 1,4-bis(chloromethoxymethyl)benzene, chlorinated dibenzodioxins, copper 8-hydroxyquinoline, 2,4-D and its esters, 1,2-dibromo -3- chloropropane, trans-1,4-dichlorobutene, dihydroxybenzenes such as catechol, resoricinol, and hydroxyquinone, dimethoxane, eosin and eosin disodium salt, ethylene dibromide, hexamethylphosphoramide, isopropyl alcohol and isopropyl oils, methyl iodide, para-quinone, succinic anhydride, 2,4,5-T and esters, and 1,2,3-tris(chloromethoxy)propane.

78-0612. Zamfir, Gh. (Inst. Ig. Sanat. Publ., Iasi, Romania) **Probleme de sanatate publica ridicate de substante chimice cu activne mutagena, teratogena si cancerigena. [Public health problems caused by chemicals with mutagenic, teratogenic and carcinogenic effects.]** *Igiena* 26(3): 203-208; 1977. (23 references) (Rumanian)

Studies on the mutagenic, teratogenic and carcinogenic effects of pesticides and other chemical substances are reviewed. Ziram and zineb were found to interfere with oogenesis and spermatogenesis in rats, causing more or less complete sterility, increased fetal resorption, and developmental anomalies. Zineb and trichlorfon had mutagenic effects in other experiments. Parathion, malathion, carbaryl, 2,4-D, 2,4,5-T, and TMTD have teratogenic effect.

78-0613. Verma, S. R. ; Bansal, S. K.; Dalela, R. C. (Zoology Dept. D.A.V. College, Muzaffarnagar--251001 (U.P.) India) **Bioassay trials with a few organic biocides on fresh water fish** ***Labeo rohita.*** *Indian J. Environ. Health* 19(2): 107-115; 1977. (18 references)

The effects of the organochlorine pesticide, chlordane and the organophosphates ekatin, (thiometon) ekalux (quinalphos), and sumithion on *Labeo rohita* were studied. Fish were exposed to varying concentrations of these chemicals for 24, 48, 72, and 96 hr periods in a controlled environment. In control experiments behavior of control fish was normal throughout the experiment and no mortality was observed. TL_{50} values at 96 hr. and presumably harmless concentrations of these pesticides, respectively, in mg/L were: chlordane (0.18, 0.54), ekalux (3.72, 1.140), ekatin (3.82, 1.14900), sumithion (4.63, 1.440). These values of presumably harmless concentrations can be used in the formulation of water pollution standards for these biocides.

78-0614. Verma, S. R. ; Bansal, S. K.; Dalela, R. C. (Dep. Zool., D.A.V. Coll., Muzaffarnagar-251001 (U.P.) India) **Quantitative estimation of biocide residues in a few tissues of** ***Labeo rohita*** **and** ***Saccobranchus fossilis.*** *Indian J. Environ. Health* 19(3): 189-198; 1977. (27 references)

Residues of chlordane, metasystox -R(oxydemeton), and sevin (carbaryl) were quantitatively estimated in two fresh water teleost fishes, *Labeo rohita* and *Saccobranchus fossilis*, after treatment times of up to 45 days. After the normal process of acclimatization, the fishes were transferred into experimental solutions of 0.12 mg/l chlordane, 5.00 mg/l Metasystox-R, and 8.42 mg/l sevin. Chlordane levels in *Saccobranchus fossilis* ranged from 0.20 ppm by weight in the kidney after 45 days to 9.22 ppm by weight in gills after 4 days. Chlordane levels, by weight, in *Labeo rohita* ranged from 0.11 ppm in the kidney after 45 days to 10.91 ppm in gills after 4 days. Metasystox-R levels, by weight, in *Saccobranchus fossilis* ranged from 0.12 ppm in the intestine after 45 days to 6.95 ppm in the gill after 4 days. Comparable Metasystox-R levels in *Labeo rohita* were 0.22 ppm and 7.22 ppm, respectively. Sevin levels, by weight, in *Saccobranchus fossilis* ranged from 0.20 ppm in the kidney after 30 days to 6.03 ppm in the gill after 4 days. Comparable levels in *Labeo rohita* were 0.12 ppm and 6.84 ppm, respectively. Residues in liver and muscles were intermediate between these extremes.

78-0615. Ali, F. S. ; Hasan, M. (Brain Res. Lab., Dep. Anat., Jawaharlal Nehru Med. Coll., Aligarh Muslim Univ., Aligarh, 202001, India) **Effect of organophosphate insecticide dichlorvos on the amino acid content of different regions of the rat brain and spinal cord.** *Indian J. Exp. Biol.* 15(9): 759-761; 1977. (16 references)

Male Charles Foster rats were administered 3 mg/kg dichlorvos (ip) daily for 15 days. The animals were then sacrificed, and the free amino acids in the brain and cervical spinal column were determined. Lysine was reduced in the cerebellum from 20.5 micromoles/g fresh tissue in treated

rats, and was not significantly reduced elsewhere. Taurine was significantly reduced in all regions examined, and the greatest reduction was from 23.6 micromole/g fresh tissue in controls to 14.8 micromole/g fresh tissue in treated rats in the cerebellum. Serine was not significantly reduced in any region studied. Aspartic acid was reduced from 14.2 micromole/g fresh tissue to 7.7 micromole/g fresh tissue in the brainstem and from 30.9 micromole/g fresh tissue to 12.2 micromole/g fresh tissue in the spinal cord, but not significantly in the cerebrum or cerebellum. The phenylalanine concentration was reduced from 10.7 micromole/g fresh tissue to 5.8 micromole/g fresh tissue in the brainstem and from 9.8 micromole/g fresh tissue to 3.7 micromole/g fresh tissue in the spinal cord. Glycine and GABA concentrations were significantly reduced only in the brain stem and spinal cord.

78-0616. Tariq, S. ; Haqqi, M.; Adhami, U. M. (Genet. Cytogenet. Res. Lab., Dep. Zool., Aligarh Muslim Univ., Aligarh, 202001 India) **Effect of thiotepa (triethylenethiophosphoramide) on RNA and total protein content in the testes of albino rat.** *Indian J. Exp. Biol.* 15(9): 804-805; 1977.

A significant interest in aziridine derivatives began after the discovery of their property as insect chemosterilants. The effect of thiotepa on the RNA and total protein content in the testes of normal albino rats is reported. Albino rats were injected (ip) with a single dose of 0.5 mg of thiotepa, dissolved in double distilled water, per 100 g of body weight. At 24 hr after treatment protein content in the testes of treated animals was 560.83 μg/100 mg fresh tissue, as compared to 704.89 μg/100 mg fresh tissue in the controls; 72 hr after treatment protein content in the testes of treated rats was 688.96 μg/100 mg fresh tissue, as compared to 705.48 μg/100 mg fresh tissue in the controls. RNA phosphorus content in the testes was 29.62 μg/100 mg fresh tissue in treated rats and 61.96 μg/100 mg fresh tissue in controls after 24 hr; after 72 hr RNA phosphorus content in the testes was 58.06 μg/100 mg fresh tissue in treated rats and 62.61 μg/100 mg in controls. The reduced RNA and protein content can only be accounted for by the inhibition of RNA synthesis in the nucleus.

78-0617. Greim, H. (Gesellsch. Strahlen- Umweltforsch. mbH, Abt. Toxikol, Post Oberschleissheim, D-8042, Neuherberg, FRG) **Zur Toxikologie von Zusatzstoffen und Rueckstaenden in Nahrungsmitteln. [Toxicology of food additives and residues.]** *Internist* 18(9): 492-497; 1977. (30 references) (German)

General toxicological aspects of food additives and residues in foodstuff are reviewed. Organophosphate pesticides are usually highly toxic, but they are rapidly degraded in the environment, plants and animals. Therefore, they cause practically no residue problems in food. Organochlorine pesticides, such as DDT, are of low toxicity but highly persistent; they accumulate in the environment and in trophic chains, and account for the major part of the pesticide residues found in food. Due to lipophilic character of organochlorine pesticides, their residue levels are higher in food of animal origin than in plants.

78-0618. Berkhamov, M. Kh. ; Kuzamyshev, V. M.; Godovikov, N. N.; Agabekian, R. S.; Kireeva, E. G.; Zhasminova, V. G.; Gurdaliev, Kh. Kh.; Kabachnik, M. I. (Institute of Heteroorganic Compounds, Acad. Sci. USSR, Moscow, USSR) **Sintez i vzaimodeistvie s kholinesterazami *O*-etil-*O*-(beta- alkilmerkaptoetil)-benzilfosfonatov i ikh iodmetilatov. [Synthesis and interaction with cholinesterases of *O*-ethyl-*O*-(beta- alkylmercaptoethyl) benzylphosphonates and their iodomethylates.]** *Izv. Akad. Nauk SSSR, Ser. Khim.* (9): 2095-2098; 1977. (5 references) (Russian)

O-Ethyl-*O*-(beta- alkylmercaptoethyl) benzylphosphonates and their iodomethylates were synthesized, and their effects on human erythrocyte acetylcholinesterase (AChE) and equine serum butyrylcholinesterase (BuChE) were studied. The compounds were found to be competitive reversible inhibitors of AChE and BuChe. The benzylphosphonates synthesized were found to be less potent BuChE inhibitors than are the corresponding cyclohexylphosphonates, while their activity is comparable to that of phenylphosphonates. The elongation of the alkyl radical at the sulfide sulfur atom leads to about an 8-fold increase of the inhibiting activity. The compounds tested are less potent with respect to AChE than they are with respect to BuChE. Their AChE-inhibiting activity is comparable to that of cyclohexylphosphonates, and weaker than that of phenylphosphonates. The elongation of the alkyl radical at the sulfide sulfur atom leads to 27-fold increase of the cholinesterase-inhibiting activity. The transition from non-charged to charged compounds leads to a 5-20-fold increase of the BuChE-inhibiting activity, and to a 4.3-fold increase of the AChE-inhibiting activity.

78-0619. Bekanov, M. Kh. ; Godovikov, N. N.; Berkhamov, M. Kh.; Agabekian, R. S.; Kuzamyshev, V. M.; Ol'khovaia, G. G.; Kabachnik, M. I. (Inst. Heteroorg. Compounds, Acad. Sci. USSR, Moscow, USSR) **Vzaimodeistvie iodmetilatov *O*-alkil-*O*-(beta- alkilmerkaptoetil) fenilfosfonatov s kholinesterazami. [Interaction of *O*-alkyl-*O*-(beta-alkylmercaptoethyl) phenylphosphonate iodomethylates with cholinesterases.]** *Izv. Adad. Nauk SSSR, Ser. Khim.* 9: 2099-2101; 1977. (5 references) (Russian)

The effect of iodomethylates of *O*-ethyl-*O*- (beta- alkylmercaptoethyl) phenylphosphonates (IEAPP) and *O*-alkyl-*O*-(beta- methylmercaptoethyl) phenylphosphonates (IAMPP) on human erythrocyte acetylcholinesterase (AChE) and equine serum butyrylcholinesterase (BuChE) was studied. Both IEAPP and IAMPP proved to be competitive, reversible inhibitors of AChE and BuChE. The AChE-inhibiting activity of IEAPP was strongly dependent on the length of the alkyl radical at the sulfur atom; the elongation of this radical from methyl to hexyl was accompanied by a 74-fold increase of the inhibiting activity. The introduction of charge into the phenylphosphonate molecule had practically no influence on the ability of IEAPP to reversibly inhibit BuChE. The inhibiting activity of the charged and non-charged compounds was symbathic for AChE and BuChE. IAMPP with butoxyl radicals were the most potent BuChE inhibitors, while the AChE-inhibiting activity increased with the elongation of the alkoxyl radical.

78-0620. Quistad, G. B. ; Staiger, L. E.; Schooley, D. A. (Zoecon Corp. Res. Lab., Palo Alto, CA 94304) **Environmental degradation of the miticide cycloprate (hexadecyl cyclopropanecarboxylate). 1. Rat metabolism.** *J. Agric. Food Chem.* 26(1): 60-66; 1978. (31 references)

When rats were given a single oral dose (21 mg/kg) of [*carboxyl*-^{14}C] cycloprate (hexadecyl cyclopropane carboxylate), two-thirds of the applied dose was excreted within 1 day. After 4 days 67 and 15% of the applied ^{14}C label had been excreted in the urine and feces, respectively, but 18% still remained in the tissues. Analysis of the tissue-bound radioactivity revealed that 80% of the residual ^{14}C was associated with fatty acids and two-thirds of all the tissue radiolabel was contributed by three ω-cyclopropyl fatty acids which were identified as 11-cyclopropyl undecanoic acid,13-cyclopropyl tridecanoic acid, and 15-cyclopropyl pentadecanoic acid. Cycloprate contributed only 1-3% of the total ^{14}C label found in tissues. The major excretory metabolite in feces was cyclopropane carboxylic acid, while in urine *N*-(cyclopropylcarbonyl) glycine represented 85% of the 1-day urinary radiolabel (or 46% of the applied dose). Rats analyzed 60 days after dosage at 21 mg/kg still contained 5% of the applied ^{14}C label, but reduction of the dose rate to 1 mg/kg lowered the percentage of ^{14}C residue in tissues by half after 4 days. (Author abstract by permission of the American Chemical Society)

78-0621. Quistad, G. B. ; Staiger, L. E.; Schooley, D. A. (Zoecon Corp. Res. Lab., Palo Alto, CA 94304) **Environmental degradation of the miticide cycloprate. 2. Metabolism by apples and oranges.** *J. Agric. Food Chem.* 26(1): 66-70; 1978. (8 references)

The degradation of cycloprate (hexadecyl cyclopropane carboxylate) was studied on the foliage and fruit of dwarf apple and orange trees. The single major metabolite on both fruit and foliage was cyclopropane carboxylic acid (up to 38% applied dose) with ω-cyclopropyl fatty acids also abundant (up to 14% applied dose). These metabolites were found predominantly as polar conjugates, being relatively unimportant as free acids. The mixture of ω-cyclopropyl fatty acids was resolved into 15-cyclopropyl pentadecanoic, 15-cyclopropyl pentadecenoic, and, apparently, 17-cyclopropyl heptadecenoic acids which contributed up to 8, 4, and 0.3% of the applied dose, respectively. Cycloprate applied to the surface of fruit does not penetrate the outer surface and neither cycloprate nor cyclopropane carboxylic acid translocated into fruit from treated leaves in significant levels (< 0.4%). (Author abstract reprinted by permission of the American Chemical Society)

78-0622. Quistad, G. B. ; Staiger, L. E.; Schooley, D. A. (Zoecon Corp. Res. Lab., Palo Alto, CA 94304) **Environmental degradation of the miticide cycloprate (hexadecyl cyclopropanecarboxylate). 3. Bovine metabolism.** *J. Agric. Food Chem.* 26(1): 71-75; 1978. (12 references)

When a lactating cow was given a single oral dose (0.3 mg/kg) of [*carboxyl*-^{14}C] hexadecyl cyclopropane carboxylate, 89, 5, and 6% of the applied dose was excreted in urine, feces, and milk, respectively. After 7 days 65 and 7% of the applied dose was eliminated as urinary *N*-(cyclopropyl carbonyl)glycine and free cyclopropane carboxylic acid. While trace amounts of cycloprate (0.01 ppm) were found in milk, the majority of the ^{14}C residue in milk (52-76%) was characterized as triacylglycerols. Analysis of the latter showed the radiolabel was contained in cyclopropane carboxylic acid and a homologous series of C_8-C_{18} saturated ω-cyclopropyl fatty acids, with 13-cyclopropyl tridecanoic acid representing about half of the ^{14}C acids. *O*-(Cyclopropylcarbonyl) carnitine contributed 11-39% of the total ^{14}C in milk and was also the primary metabolite retained in trace quantities in muscle (0.04-0.06 ppm). (Author abstract reprinted by permission of the American Chemical Society)

78-0623. Quistad, G. B. ; Staiger, L. E.; Schooley, D. A. (Zoecon Corp. Res. Lab., Palo Alto, CA 94304) **Environmental degradation of the miticide cycloprate (hexadecyl cyclopropanecarboxylate). 4. Beagle dog metabolism.** *J. Agric. Food Chem.* 26(1): 76-80; 1978. (22 references)

When beagle dogs were given a single oral dose at 0.7 mg/kg of [*carboxyl*-^{14}C]cycloprate (hexadecyl cyclopropane carboxylate) only 25 and 2% of the applied dose was excreted after 4 days in urine and feces, respectively. Thus, 73-77% of the administered radiolabel was retained mainly in kidney (7%), liver (2%), adipose tissue (6%), hide (6%), and muscle (56%). About two-thirds of the ^{14}C in adipose tissue and hide was characterized as ω-cyclopropyl fatty acids (as triacylglycerols) with 13-cyclopropyl tridecanoic acid being the major component. These ω-cyclopropyl fatty acids also comprised the main ^{14}C residue in liver and kidney where 28 and 67% existed as [^{14}C]phospholipid. About half of the applied radiolabel was retained in muscle as a unique conjugated pesticide metabolite, *O*-(cyclopropyl) carbonyl) carnitine. (Author abstract reprinted by permission of the American Chemical Society)

78-0624. Ivie, G. W. (Vet. Toxicol. Entomol. Res. Lab., Agric. Res. Serv., U.S. Dep. Agric. Coll. Stn., TX 77840) **Fate of diflubenzuron in cattle and sheep.** *J. Agric. Food Chem.* 26(1): 81-89; 1978. (23 references)

The fate of a radiolabeled preparation of the insect growth regulator diflubenzuron (Dimilin, TH-6040, *N*-[[(4-chlorophenyl) amino] carbonyl]- 2,6-difluorobenzamide) was determined after oral administration to a lactating cow and castrate male sheep, in vitro incubation with ovine and bovine digestive tract fluids, and dermal application to cattle. Orally administered diflubenzuron was absorbed, extensively metabolized, and almost totally excreted by cattle and sheep. Only very small amounts of carbon-14 were secreted into the milk of a cow fed [^{14}C]diflubenzuron. Studies with bile-duct cannulated sheep showed that bile is of greater importance than urine in the elimination of diflubenzuron metabolites from the body of ruminants. Major metabolites of diflubenzuron excreted by the cow and sheep resulted from hydroxylation on the difluorobenzoyl and chlorophenyl rings and by cleav-

age between the carbonyl and amide groups to give metabolites that were excreted either free or as conjugates. Diflubenzuron was not metabolized when incubated with digestive tract fluids from these ruminants. When applied dermally to cattle held outdoors in an unprotected pasture, diflubenzuron residues disappeared rapidly, but the compound was not chemically degraded or absorbed through the skin to any detectable degree. The major hydroxylated diflubenzuron metabolite in cow milk when fed to white rats was rapidly and quantitatively excreted with little further biotransformation. (Author abstract by permission of the American Chemical Society)

78-0625. Ivie, G. W. ; Wright, J. E. (Vet. Toxicol. Entomol. Res. Lab., Agric. Res. Serv., U.S. Dep. Agric. Coll., Stn., TX 77840) **Fate of diflubenzuron in the stable fly and house fly.** *J. Agric. Food Chem.* 26(1): 90-94; 1978. (13 references)

The metabolic fate of [^{14}C]diflubenzuron (Dimilin, TH-6040, *N*-[[(4-chlorophenyl) amino] carbonyl]- 2,6-difluorobenzamide) was studied after topical application to adult stable flies and house flies. Four days after treatment, radiocarbon residues were detected both on the surface and internally in the treated flies and in untreated flies of the opposite sex held with the treated flies. From 35 to 50% of the radiocarbon applied to the flies was detected in the excreta. Diflubenzuron was quite resistant to metabolism by stable flies; > 97% of the recovered radiocarbon was the parent compound. House flies metabolized about 10% of the dose. These insects metabolized diflubenzuron by cleavage between the carbonyl and amide groups and by several undefined mechanisms. Treated stable flies secreted up to 1% of the dose into the eggs as unmetabolized diflubenzuron, but eggs from house flies contained much lower residues. Secretion of diflubenzuron into the egg and resulting toxicity to the developing embryo probably accounts for the "sterility" observed in the adults of several insect species exposed to this insecticide. (Author abstract reprinted by permission of the American Chemical Society)

78-0626. Bush, P. B. ; Tanner, M.; Kiker, J. T.; Page, R. K.; Booth, N. H.; Fletcher, O. J. (Ext. Poult. Sci. Dep. Univ. Georgia, Athens, GA 30602) **Tissue residue studies on toxaphene in broiler chickens.** *J. Agric. Food Chem.* 26(1): 126-130; 1978. (14 references)

Low levels of toxaphene (0, 0.22, 0.40, 2.16, and 3.82 ppm) were added to the diets of unsexed broiler chicks from 1 day of age. Each treatment consisted of 90 randomly selected birds (30 birds in each of three replicates). On the sixth week, 15 birds in each replicate were transferred to floor pens and fed toxaphene-free feed. Three birds from each on the replicates were sacrificed at 2-week intervals. Liver, heart, gizzard, kidneys, skeletal muscle, and fat tissue samples were taken for residue analysis. The accumulation of toxaphene in the adipose tissue of 8-week-old broilers was best described by the equation: $y = 0.765 + 4.081x$, where y = ppm of toxaphene in adipose tissue, x = ppm of toxaphene in the ration (detectability limit = 1.0 ppm). Toxaphene dissipation was characterized by the following equation: $y = \exp(0.280\chi + 1.97)$. Histopathological examination of 4- and 8-week-old birds revealed no significant lesions in any of the tissues examined. (Author abstract reprinted by permission of the American Chemical Society)

78-0627. Anderson, B. M. ; Kohler, S. T.; Young, R. W. (Dep. Biochem. Nutr., Virginia Polytech. Inst. St. Univ., Blacksburg, VA 24601) **Interactions of kepone with rabbit muscle lactate dehydrogenase.** *J. Agric. Food Chem.* 26(1): 130-133; 1978. (12 references)

The inhibition of rabbit muscle lactate dehydrogenase catalyzed oxidation of lactic acid by the polychlorinated hydrocarbon pesticide, Kepone, (chlordecone) was investigated with respect to the documentation of direct interactions of the pesticide with this enzyme in the absence of the coenzyme, NAD. The slow loss of catalytic activity of this dehydrogenase in 20% ethanol is greatly increased by the presence of micromolar concentrations of Kepone, and the rate enhancement observed was proportional to the concentration of Kepone added. The suggestion that the Kepone effect results from a direct interaction with the enzyme, resulting in a destabilization of protein structure, is supported by the protective effects observed with NAD and NADH. Using fluorescence quenching techniques, no evidence was obtained for complex formation between Kepone and 3-aminopyridine adenine dinucleotide. In addition, the properties of the Kepone inhibition of rabbit muscle lactate dehydrogenase did not change when the chemical structure of the pyridinium and purine moieties of the coenzyme were varied. These observations add further support to a proposed direct interaction of Kepone with the enzyme as a mode of inhibition by the pesticide. (Author abstract reprinted by permission of the American Chemical Society)

78-0628. Ripley, B. D. ; Cox, D. F.; Wiebe, J.; Frank, R. (Prov. Pestic. Residue Testing Lab., Ontario Minist. Agric. Food, Univ. Guelph, Guelph, Ont. N1G 2W1, Canada) **Residues of dikar and ethylenethiourea in treated grapes and commercial grape products.** *J. Agric. Food Chem.* 26(1): 134-136; 1978. (10 references)

Residues of Dikar, viz., EBDC (ethylenedithiocarbamate) as zineb equivalent and dinocap, and the EBDC degradation product ethylenethiourea (ETU) were monitored in Concord grapes following application of the fungicide in 1975 and 1976. Mean values of 6.8 ppm zineb, 0.38 ppm dinocap, and 0.03 ppm ETU were found immediately after application and these residues dissipated by 50% in the first 15-20 days; thereafter slight dilution due to growth was observed. Wine prepared from the harvested grapes contained a mean of 0.037 ppm ETU and no residues of EBDC. Heat treatment of the harvested grapes demonstrated an 18% conversion of EBDC to ETU. Commercial grape products were also analyzed and most showed < 0.02 ppm ETU except concentrate which contained 0.06 ppm ETU; EBDC was found

in only one of these samples. (Author abstract reprinted by permission of the American Chemical Society)

78-0629. Rickard, R. W. ; Dorough, H. W.; Pan, S. H. (Dep. Entomol., Grad. Cent. Toxicol., Univ. Kentucky, Lexington, KY 40506) **Metabolic capabilities of the *Salmonella* mutagenicity test system.** *J. Agric. Food Chem.* 26(1): 141-146; 1978. (22 references)

^{14}C-labeled 2-acetylaminofluorene (AAF), carbaryl, DDT, and heptachlor were incubated with various components of the *Salmonella typhimurium* system used to detect mutagens and carcinogens. The bacteria, strain TA98, did not degrade any of the compounds except DDT during 48 h of incubation and then only when excess histidine was added to promote microbial growth. Approximately 20% of the DDT was converted to water-soluble materials and 1% to DDD. Addition of a rat liver fraction, 9000g solubles, to the system resulted in extensive metabolism of AAF (90%) and carbaryl (75%) after only 15 min. The metabolites were generally the same as those previously reported for intact animals, and, thus, the bacteria were exposed to products characteristics of mammalian metabolism. Heptachlor was rapidly converted to its epoxide form, 75% in 15 min, but the metabolic process essentially stopped at the point. The liver fraction did not alter DDT appreciably although its microbial degradation was the same as when the liver enzymes were omitted. With the latter two compounds, in vitro metabolism was not as extensive as that reported in in vivo studies, and, therefore, was not considered as being entirely representative of mammalian metabolism. (Author abstract reprinted by permission of the American Chemical Society)

78-0630. Sikka, H. C. ; Florczyk, P. (Life Sci. Div., Syracuse Res. Corp., Merrill Lane, Univ. Heights, Syracuse, NY 13210) **Mutagenic activity of thiocarbamate herbicides in *Salmonella typhimurium*.** *J. Agric. Food Chem.* 26(1): 146-148; 1978. (17 references)

Three thiocarbamate herbicides, diallate (*S*-(2,3-dichloroallyl) diisopropylthiocarbamate), triallate (*S*-2,3,3-trichloroallyl) diisopropylthiocarbamate), and CDEC (2-chloroallyl- *N*,*N*-diethyldithiocarbamate), were evaluated for their ability to induce mutations in four histidine-requiring strains of *Salmonella typhimurium* (TA 100, TA 1535, TA 98, and TA 1538) with and without a rat liver microsomal activation system (Ames test). These herbicides were mutagenic in TA 100 and TA 1535 (base-pair substitution mutants) only in the presence of the liver microsomal preparation, indicating that the chemicals require metabolic activation for their conversion into active mutagens. None of the herbicides caused mutations in strains TA 98 and TA 1538 (frameshift mutants). Diallate was considerably more potent than triallate or CDEC, showing mutagenic activity at 1 μg/plate. (Author abstract reprinted by permission of the American Chemical Society)

78-0631. Chen, Y. S. ; Casida, J. E. (Lab. Pestic. Chem. Toxicol. Dep. Entomol. Sci., Univ. Calif. Berkeley, CA 94720) **Thiocarbamate herbicide metabolism: Microsomal oxygenase metabolism of EPTC involving mono- and dioxygenation at the sulfur and hydroxylation at each alkyl carbon.** *J. Agric. Food Chem.* 26(1): 263-267; 1978. (11 references)

Metabolism of *S*-ethyl dipropylthiocarbamate (EPTC) by the mouse liver microsome-NADPH system involves oxidative attack at the following sites in decreasing relative importance: sulfur, α carbon of ethyl group, α carbon of propyl group, β carbon of propyl group, γ carbon of propyl group, and β carbon of ethyl group. The metabolites hydroxylated at the carbons α to the nitrogen and sulfur decompose at physiological pH, yielding *S*-ethyl *N*-propylthiocarbamate (*N*-depropyl-EPTC) in the former case and carbonyl sulfide and acetaldehyde from the latter compound. [^{14}C]EPTC sulfoxide is further oxidized to [^{14}C]EPTC sulfone which is most easily detected with microsomal preparations pretreated with unlabeled EPTC sulfone to block protein sites undergoing carbamoylation. These findings are consistent with previous studies on in vivo metabolism of EPTC in mammals which indicate major involvement of the sulfoxide intermediate and further suggest that hydroxylation of the carbon α to the sulfur is an important mechanism for thiocarbamate cleavage. (Author abstract reprinted by permission of the American Chemical Society)

78-0632. Reddy, G. ; Khan, M. A. Q. (Dep. Biol. Sci., Univ. Illinois Chicago Circ., Chicago IL 60680) **Urinary metabolites of [^{14}C]photodieldrin in male rabbits.** *J. Agric. Food Chem.* 26(1): 292-294; 1978. (17 references)

Oral and intraperitoneal treatment of male rabbits with [^{14}C]photodieldrin resulted in the excretion of about 50% of the administered dose in urine. More than 98% of the radioactivity in urine was water soluble, about 30% of which was hydrolyzable with glucuronidase and about 6% with HCl. The remaining unhydrolyzable radioactivity was unextractable. Photodieldrin *trans*-diol was the major product followed by photodieldrin ketone and remaining minor unidentified products. (Author abstract reprinted by permission of the American Chemical Society)

78-0633. Guenthner, T. M. ; Nebert, D. W. (Dev. Pharmacol. Branch, Nat. Inst. Child Health, Human Dev., Natl. Inst. Health, Bethesda, MD 20014) **Cytosolic receptor for aryl hydrocarbon hydroxylase induction by polycyclic aromatic compounds.** *J. Biol. Chem.* 252(24): 8981-8989; 1977. (65 references)

The data presented in this report demonstrate the presence of a saturable, homogeneous, small population of high affinity binding sites for TCDD in the cytosol of four established tissue culture lines. Not only does this highly specific binding of TCDD occur in two responsive cell lines whose aryl hydrocarbon hydroxylase is induced in response to TCDD, but cytosolic binding sites of similar affinity and number per cell also exist in two nonresponsive cell lines whose hydroxylase activity is negligibly induced in response to large concentrations of TCDD. It is suggested that the

high affinity binding of TCDD represents the cytosolic receptor required for aryl hydrocarbon hydroxylase induction.

78-0634. Smith, A. P. ; Muir, A. W. (Chem. Def. Estab., Porton Down, Salisbury, Wilts SP4 OJQ U.K.) **Antidotal action of the oxime HS6 at the soman poisoned neuromuscular junction of the rat and guinea-pig.** *J. Pharm. Pharmacol.* 29(12): 762-764; 1977. (11 references)

Anaesthetized male albino Porton strain rats and guinea-pigs were infused intravenously with doses of soman sufficient to produce 80-90% blockade of tetanic tension of the gastrocnemius muscle within 6 min. This was achieved with 0.36 micromol/kg soman in the guinea-pig and 0.47 micromol/kg in the rat. Animals were pretreated with 10 micromol/kg atropine sulfate 5 min before soman infusion, and a miniature pump was used to maintain respiration. One, 16, or 64 min after completion of soman infusion 130 micromol/kg HS6 or P_2S was injected intravenously. In the guinea-pig HS6 restored tetanic height to approximately 80% or more of maximum within 20 min after it was administered; P_2S treatment had no effect. Similar results were obtained in the rat. HS6 restored 40-70% tetanic tension in guinea-pigs given 4 and 16 times the 6 min blocking dose of soman. Blood samples were removed after oxime treatment in rats initially poisoned with 0.47 micromol/kg soman. 17% cholinesterase activity was regenerated within 10 min by HS6 given 1 min after soman infusion, but no reactivation occurred when oxime administration was delayed for 64 min. No cholinesterase reactivation could be detected in guinea-pigs. In guinea pigs, second infusions of 0.36 micromol/kg soman were given 10 min after HS6 was given to reverse blockage of tetanus produced by initial infusions of 0.36 micromol/kg soman 1, 16, or 64 min previously. Tetanic height was reduced to approximately 10%, 60%, and 70% of maximum by the second infusion when 1, 16, and 64 min, respectively, elapsed before the HS6 was given. If these decreases are solely due to inhibition of previously reactivated acetylcholinesterase, it is unlikely that enzyme reactivation is responsible for restoration of neuromuscular function when therapy is delayed.

78-0635. Faith, R. E. ; Moore, J. A. (Natl. Inst. Environ. Health Sci., NIH, Res. Triangle Park, NC) **Impairment of thymus-dependent immune functions by exposure of developing immune system to 2,3,7,8-tetrachlorodibenzo- *p*-dioxin (TCDD).** *J. Toxicol. Environ. Health* 3(3): 451-464; 1977. (37 references)

The effects of postnatal and both pre- and postnatal exposure to TCDD on the developing immune system were investigated. Female Fischer-344 rats were used in this experiments. Nursing rats were dosed with TCDD, 5 mg/kg, on postnatal days 0, 7, and 13. The prenatal-postnatal group was dosed with TCDD, 5 g/kg, on gestational day 18. Body weights and thymus/body weight ratios were suppressed for up to 145 days in the prenatal-postnatal group, but only up to 36 days in the postnatal group. Cell-mediated and humoral immune function were also studied. Only cell-mediated immune function was suppressed by TCDD; however, helper cell function was not suppressed. This study shows that prenatal-postnatal exposure to TCDD induces suppression of thymus-dependent immune functions for at least 6 mo.

78-0636. Ehrich, M. ; Cohen, S. D. (Sec. Pharmacol. Toxicol., Sch. Pharm., Univ. Connecticut, Storrs, CT) **DDVP (dichlorvos) detoxification by binding and interactions with DDT, dieldrin, and malaoxon.** *J. Toxicol. Environ. Health* 3(3): 491-500; 1977. (20 references)

The effects of DDT and dieldrin on DDVP (dichlorvos) binding by mouse liver cells and its toxicity were studied, as were the effects of DDVP on malaoxon and paraoxon binding and toxicity. In vitro mouse liver inactivated DDVP, malaoxon, and paraoxon under the assay conditions. Triorthotolyl phosphate (TOTP) administered at 125 mg/kg, ip, 18 hr before sacrifice inhibited binding of the three organophosphates. Dieldrin (16 mg/kg, po) and DDT (50 mg/kg, ip) increased liver/body weight ratios and decreased the duration of the pentobarbital induced loss of righting ability. Dieldrin (but not DDT) increased liver carboxylesterase activity and liver binding of malaoxon and paraoxon, but not DDVP. DDVP (30 mg/kg ip) administered 30 min before sacrifice inhibited liver binding inactivation of malaoxon, and potentiated anticholinesterase action of malaoxon when administered at 10 mg/kg, ip, before sacrifice. These studies indicate that carboxylesterase binding does not represent an important mechanism for DDVP detoxification in mice.

78-0637. Tagatz, M. E. ; Ivey, J. M.; Moore, J. C.; Tobia, M. (EPA, Environ. Res. Lab., Gulf Breeze, Florida) **Effects of pentachlorophenol on the development of esturine communities.** *J. Toxicol. Environ. Health* 3(3): 501-506; 1977. (9 references)

The effects of pentachlorophenol (PCP) on esturine biota colonization was studied by comparing numbers and species of animals that grew from planktonic larvae in three apparatuses continuously exposed to an average of 7, 76, or 622 μg PCP/L for 9 wk; the water was then siphoned off through a fine wire mesh, and the animals were collected and preserved. Annelids, arthropods, and molluscs were the numerically dominant phyla after 9 wk. Mollusc population was markedly decreased at 7 μg/L, and annelids and arthropods were markedly decreased at 76 μg/L. Virtually no animals survived at 622 μg/L. Total numbers and species were significantly decreased ($\alpha = 0.01$) in aquaria exposed to 67 μg/L than in those unexposed or exposed to 7 μg/L. PCP altered the ecological structure of experimental communities; in nature PCP could conceivably interrupt the community ecostructure.

78-0638. Clark, D. R., Jr. ; Kroll, J. C. (U.S. Dep. Inter., Fish Wildl. Serv., Patuxent Wildl. Res. Cent., Laural, MD) **Effects of DDE on experimentally poisoned free-tailed bats (*Tadarida brasiliensis*): lethal brain concentrations.** *J. Toxicol. Environ. Health* 3(5-6): 893-901; 1977. (9 references)

Seventeen adult female free-tailed bats were fed meal-

worms containing 107 ppm DDE for 40 days; five other adult female free-tailed bats were fed untreated mealworms. One dosed bat was killed accidentally during this time. After the treatment period, four dosed bats were frozen, and the remaining 17 bats were starved to death in order to elevate brain levels of DDE to lethality. At the onset of starvation, dosed bats weighed an average of 9.31 g as compared to 10.00 g for the controls. The body condition, as determined by weight in grams/length of forearms in millimeters multiplied by 100, after starvation was 15.89 for dosed bats and 17.14 for controls. The amounts of carcass fat did not differ significantly. During starvation, dosed bats lost an average of 0.55 grams/day as compared to 0.29 grams/day for controls. Four dosed bats exhibited prolonged tremoring. The estimated diagnostic lethal level of DDE in the brain was 519 ppm, with a range of 458 to 564 ppm. DDE in the brain ranged from 379 ppm to 564 ppm in starved, dosed bats, from 2.4 ppm to 6.9 ppm in starved, control bats, from 78 ppm to 90 ppm in dosed bats killed before starvation, and from 0.19 ppm to 0.66 ppm in bats which had been neither dosed nor starved. DDE in lipids ranged from 55,771 ppm to 90,512 ppm in starved, dosed bats, from 85 ppm to 377 ppm in starved, control bats; from 11,470 ppm to 15,640 ppm in dosed bats killed before starvation; and from 1.6 ppm to 5.7 ppm in bats which had been neither dosed nor starved. DDE in the carcass as a whole ranged from 543 ppm to 1,225 ppm in starved, dosed bats; from 1.5 ppm to 3.1 ppm in starved, control bats; from 478 ppm to 623 ppm in dosed bats killed before starvation; and from 0.21 to 0.61 ppm in bats which had been neither dosed nor starved. In the 17 dosed bats, levels of DDE in the brain increased as carcass fat decreased.

78-0639. Parkki, M. G. ; Marniemi, J.; Vainio, H. (Dep. Physiol., Univ. Turku, Turku, Finland) **Long-term effects of single and combined doses of DDT and PCB on drug-metabolizing enzymes in rat liver.** *J. Toxicol. Environ. Health* 3(5-6): 903-911; 1977. (37 references)

Doses of 160 mg/kg DDT and 100 mg/kg Clophen A-50, a polychlorinated biphenyl mixture, were administered ip to male Wistar rats either separately or in combination. Cytochrome P-450 increased three- to fourfold with all treatments, the maximal induction being achieved between 1 and 2 wk. After 1 month the cytochrome P-450 concentration was still elevated to levels as high as double the control value. NADPH-cytochrome c reductase activity reached between 2 and 3 times the control value after both single and combined doses of the compounds. With DDT and DDT plus PCB, the activity was elevated at 1 day, decreased between 1 day and 4 days, then increased to a maximum at 1 or 2 wk. *p*-Nitroanisole *O*-demethylase was enhanced six- to sevenfold by PCB and the combined treatment and three- to fourfold by DDT alone. After 1 month activity was four times the control level for the combined treatment and PCB alone and twice the control level for DDT alone. Aryl hydrocarbon hydroxylase activity increased threefold with the PCB and combined treatments and decreased almost to the control level in 1 mo. DDT alone increased activity to less than twice the control value 2 wk after treatment, following decreased activity at 1 day and 4 days. Activity returned to near control level at 3 weeks. Liver microsomal epoxide hydratase activity was increased about 2.5 fold by DDT and the combined treatment. Activity remained at this level from 1 wk to more than 4 wk after combined treatment but decreased to between 1 and 2 times the control level by 2 wk after DDT treatment. Glutathione *S*-transferase activity increased with all treatments in 1 day to about double the control activity, then decreased, then increased again so that levels after 1 mo were approximately the same as levels after 1 day. No change could be measured in UDP glucuronosyl transferase of native or digitonin-treated microsomes after DDT treatment. In trypsin-treated microsomes an almost threefold increase occurred 1 wk and 2 wk after DDT dosage, and activity reached the control level in 1 mo. In digitonin-treated microsomes, PCB and combined treatment increased activity fourfold in 1 wk, and increases reached fivefold 1 mo after combined treatment. UDP glucuronosyltransferase activity in trypsin-treated microsomes increased tenfold after these treatments, and no clear decrease could be detected within 1 mo.

78-0640. Sauerhoff, M. W. ; Chenoweth, M. B.; Karbowski, R. J.; Braun, W. H.; Ramsey, J. C.; Gehring, P. J.; Blau, G. E. (Stauffer Chem. Co., Westport, CT) **Fate of silvex following oral administration to humans** *J. Toxicol. Environ. Health* 3(5-6): 941-952; 1977. (6 references)

Seven men and one woman were given oral doses of 1 mg/kg silvex, a herbicide used against woody plants and weeds. There were no adverse effects. Plasma levels of silvex were highest between 2 and 5 hr after ingestion. Apparent first-order kinetics described the biphasic clearance of silvex from plasma. The half-lives were 4.0 hr for the initial phase and 16.5 hr for the terminal phase. Excretion of silvex in urine was also biphasic. About 65% of the dose had been excreted within 24 hr after administration. The rapid phase of excretion predominated through 36-48 hr. The half-life in this phase was 5.0 hr, and that in the latter phase was 25.9 hr. A maximum of 3.2% of the silvex and silvex conjugates were eliminated in feces. From 66.6% to 95.1% of the administered dose of silvex was excreted and recovered through 168 hr. The average amount of silvex and its conjugates excreted and recovered was 80.3%.

78-0641. Spyker, J. M. ; Avery, D. L. (Dep. Pharmacol., Univ. Ark. Med. Sci., Little Rock, AR) **Neurobehavioral effects of prenatal exposure to the organophosphate diazinon in mice.** *J. Toxicol. Environ. Health* 3(5-6): 989-1002; 1977. (24 references)

Pregnant hybrid mice were given a daily oral dose or 0, 0.18, or 9.0 mg diazinon per kg body weight throughout gestation. Offspring from all groups were viable and overtly normal. The rate of weight grain of pups from mice receiving 9.0 mg/kg diazinon was significantly slower; 0.18 mg/kg diazinon apparently did not affect weight gain. In offspring of mice receiving the lower dose, contact placing (ability to climb over a 2 cm barrier) appeared 13.3 days after birth as compared to 11.0 days for controls, and sexual maturity oc-

curred 30.0 days after birth as compared to 28.4 days for controls. When mature offspring were placed on an inclined plane with a cloth surface, offspring of treated mice lost their grip at an angle of less than 110 deg, and offspring of control mice lost their grip at an angle of 120 deg. Initial running speeds of all groups of offspring in a Lashley III maze were less than 5 m/min and increased with number of trials. Initially, all three groups had equal running speeds, but offspring of mice exposed to 9.0 mg/kg-day Diazinon ran at significantly slower speeds on the last 10 of the 45 trials. Running speeds in the maze eventually exceeded 15 m/min for the other two groups. There were no significant differences in the frequency of errors in the maze. The frequency of errors decreased for all groups as the number of trials increased, especially during the first 20 trials. After sacrifice at 101 days of age, neuropathology was evident in the forebrains of offspring of mice exposed to the higher dose. No brain pathology was observed in offspring from the lower dose group.

78-0642. Yoshida, K. ; Sekiguchi, Y.; Nagae, K. (Agric. Chem. Inspec. Stn., Min. Agric. For., Tokyo, Japan) **[Recently registered newer pesticides.]** *Kongetsu No Noyaku (Pestic. Mon.)* 1: 100-107; 1978. (Japanese)

Pesticides newly registered in Japan include Di-Trapex oil solution, containing 40% of D-D and 20% of methyl isothiocyanate as fungicide and nematicide (in soil), Lecithione EC and WP containing respectively 42 and 24% of soybean lecithin as fungicides, Saprol EC containing 15% of 1,4-bis-(2,2,2-trichloro- 1-formamidoethyl) piperazine as fungicides, and Pherodin SL containing 3.55 mg of (Z, E)-9,18-tetradecadienyl -1- acetate in one cyclindrical dispenser (7mm in diam. and in length) as an attractant for *Prodenia litura* are introduced. The acute p.o. toxicity of methyl isothiocyanate (LD_{50}, mg/kg) is 90 and 104 to male and female mouse and 175 and 72 to male and female rat, and its TLm-48 hr is 0.61 ppm to carp. The toxicity of soybean lecithin to carp TLm-48 hr is 5200 ppm. The acute p.o. toxicity of the active ingredient of Saprol (LD_{50}, mg/kg) is more than 5800, and its TLm-48 hr is more than 50 ppm to carp. The acute p.o. toxicity of the active ingredient of Pherodin SL (LD_{50}, mg/kg) is more than 1000 and its TLm-48 hr is 12 ppm to carp.

78-0643. Leonhard, S. L. (Dep. Environ. Freshwater Inst., Winnipeg, Manitoba R3T 2N6, Canada) **Uptake of fenitrothion by caged crayfish *Orconectes virilis*, in Pine Creek, Manitoba, 1973.** *Manit. Entomol.* 8: 16-18; 1978. (9 references)

In 1973 fenitrothion was sprayed by aircraft at a rate of 279 g a.i./hectare over plots in the Spruce Woods Provincial Forest, Manitoba, Canada, for control of spruce budworm. Crayfish were caged in Pine Creek, a small permanent stream, approximately 3.5 weeks before the fenitrothion was applied. Neither mortality nor behavioral changes occurred within one month after spraying. Samples of crushed whole crayfish that had been caged downstream of the spray area contained 1.37 ppm fenitrothion 19 days after spraying, but only 0.1 ppm 30 days after spraying. Samples of crushed whole crayfish that had been caged in the center of the spray area contained 0.21 ppm fenitrothion 19 days after spraying and 0.28 ppm fenitrothion 30 days after spraying. The crayfish downstream of the spray area may have eaten invertebrates killed in the spray area initially and less contaminated invertebrates later; crayfish in the spray area presumably ate contaminated invertebrates throughout the sampling period. The highest level of fenitrothion in the stream water was 0.064 mg/l, which dwindled to less than 0.1 microg/l a few hours after the spray.

78-0644. Ishikawa, T. T. ; McNeely, S.; Steiner, P. M.; Glueck, C. J.; Mellies, M.; Gartside, P. S.; McMillin, C. (Lipid Res. Ctr., Univ. Cincinnati, Cincinnati, OH) **Effects of chlorinated hydrocarbons on plasma alpha-lipoprotein cholesterol in rats.** *Metabolism* 27(1): 89-96; 1978. (24 references)

Sprague-Dawley rats were injected ip with 40 mg/kg of a chlorinated hydrocarbon (tetradifon, chlorobenzilate, kepone (chlordecone), lindane, Delthane, toxaphene, dieldrin, hexachlorobenzene, dienochlor, or Aroclor 1254) to assess the effects on the level of each compound on high-density lipoprotein cholesterol (C-HDL). At day 7, Aroclor, dieldrin, and Kepone elevated C-HDL 31%, and 24%, respectively. This elevation was still observed at 21 and at 60 days in the Aroclor group, but was not found in the dieldrin and Kepone groups by day 21. No changes were observed in liver function; however, the liver cytochrome P-450 content was greatly increased in rats receiving Aroclor, dieldrin, and Kepone. It is postulated that if chlorinated hydrocarbons selectively elevate antiatherogenic lipoproteins in man, then analogues might potentially be synthesized and the implications of man's exposure to halogenated hydrocarbons could be better understood.

78-0645. Hay, A. (Author address not given) **Dioxin meeting recommends cancer study** *Nature (London)* 271(5642): 202; 1978.

A meeting in Lyons early in January, 1978 hosted by the International Agency for Research in Cancer (IARC) and the U.S. National Institute of Environmental Health Sciences concluded that a major epidemiological survey should be established to determine whether dioxin is a carcinogen. While the general population accidently exposed to dioxin at Seveso, Italy must be monitored to assess the public health risk associated with low level exposure, monitoring chemical plant workers was considered more effective for relating dioxin exposure to clinical and pathological findings. Evidence from one industrial accident suggests a marked increase in certain types of carcinoma in workers exposed to dioxins. A larger population of workers exposed to dioxin should be studied to detect trends in carcinoma incidence which would be statistically significant. Two animal studies have identified dioxin as a carcinogen, but there is a discrepancy concerning the concentration required to produce tumors. Since compiling

information is currently more important than determining blame, chemical companies should be permitted to participate in a dioxin workers' survey without publicity. Where possible, clinical findings should be related to body dioxin levels.

78-0646. Bricaire, H. ; Luton, J. P. (Clin. Mal. Endocrin. Metabol., Hopital Cochin, F75674 Paris, France) **L'Op'DDD possede-t-il une action antimitotique? Relfexions a propos de son emploi dans le traitement des adenocarcinomes surrenaliens. [Does *o,p'*-DDD have antimitotic activity? Considerations on its use in treatment of adenocarcinoma of the adrenal cortex.]** *Nouv. Presse Med.* 6(39): 3650; 1977. (4 references) (French)

Thirty-five patients with adrenocortical adenocarcinoma (including 39 with Cushing's syndrome) were treated with *o,p'*-DDD (initial dose 12 g/day, later possibly reduced). The patients underwent partial tumor resection before treatment, and had local recurrences or metastases. Hydrocortisone and 9-alpha-fluorohydrocortisone were also given for hormone substitution. Stabilization of the malignant process and considerable regression of the tumor and metastases were achieved. Some patients survived 4-6 yr. The side effects (anorexia, nausea) were relatively mild. The findings indicate the great value of *o,p'*-DDD in the treatment of malignant tumors of the adrenal cortex and the antihormonal and antimitotic effect of the drug.

78-0647. Oshiba, K. (Osaka City Inst. Hyg., Osaka, Japan) **Nutrition and the toxicity of organic chlorides.** *Paediatrician* 6(1): 34-44; 1977. (27 references)

Fat metabolism influences the pharmacokinetics of the organic chlorides, and the presence of organic chloride influences fat metabolism. These chemicals, which are poorly metabolized and excreted, may induce acute toxicity when they are mobilized during starvation or emaciation. However, starvation has been found to have favorable effects in patients suffering from PCB intoxication. A deficiency of essential fatty acids may be aggravated by dieldrin, and the toxicity of dieldrin is increased by essential fatty acid deficiency. DDT intoxication results in an increase in the total fat content of the rat liver, with a decrease in the concentration of phospholipids and cholesterol. Increased protein in the diet leads to increased elimination of the organic chlorides, and mortality from dieldrin intoxication in rats decreases as the protein content of the diet increases. Organic chlorides increase the labilization of the lysosomal membranes observed in vitamin E deficiency, and restriction of vitamin B_2 in the diet increases the severity of symptoms and mortality rate resulting from dieldrin intoxication. The latter effect was more evident in female rats than in males. A relative deficiency of protein during pregnancy has been found to reduce the biotransformation of drugs in the rat liver, although increased organic chloride concentrations in the mother rats did not influence the fetuses. The adsorption of organic chlorides from mother's milk is not influenced by the nutritional state of the dam. Similarly, although calcium deficiency increased the PCB concentration of the liver and bone marrow of intoxicated dams, the body weights, calcium content, number of skeletal malformations, and number of live births among the fetuses were not influenced.

78-0648. Pemberton, J. M. ; Fisher, P. R. (Dep. Microbiol., Univ. Queensland, St. Lucia, Queensland, Australia) **2,4-D plasmids and persistence.** *Nature (London)* 268(5622): 72-73; 1977. (8 references)

By use of segregation and transfer analyses techniques, a strain of *Pseudomonas*, JMP116 was isolated that could degrade the herbicide, 2,4-D on Loos' medium. Experiments were run to determine whether the genes responsible for the degradation process were contained in a plasmid strand of the bacterial genome. Preliminary pseudomonad was cultured in broth containing mitomycin C. A bacteriophage which plaques on JMP116, but not on JMP119 (the derivative cured of 2,4-D degradation properties) was also isolated. Intrastrain matings between JMP116 and a malidixic acid resistant mutant of JMP119 show the transfer of a plasmid that confers upon the organism the 2,4-D degrading ability. These findings have important implications for future research in microorganism use for the degradation of pesticides in soil.

78-0649. Sawicki, B. ; Kuczynski, M. (Dep. Histol. Embryol., Inst. Biostwad, Acad. Med., Bialystok, Poland) **Badania histochemiczne komorek c tarczycy szczurow w podostrym zatruciu preparatem foschlor [Histiochemical investigations of C-cells of the rat thyroid gland in subacute poisoning with the preparation foschlor].** *Patol. Pol.* 28(4): 477-484; 1977. (33 references) (Polish)

A Foschlor (trichlorfon) preparation was administered intragastrically daily for 21 days to male white rats in dosages of 50, 100, and 250 mg/kg body weight. The 95 rats weighed between 220 g and 250 g. The rats were killed 1 or 9 days after the last Foschlor application, and their thyroid glands were studied. In rats killed 1 day after the last Foschlor application, a dose of 0.5 LD50 led to disturbances in C-cell metabolism, indicated by increased reaction to nonspecific acetylcholinesterase, decreased reaction to nonspecific esterases, and increased low-grain cytoplasm. Reactions to α-glycerophosphoran and succinate dehydrogenases did not change significantly. These changes were slight when a dose of 0.2 LD50 was administered and did not occur when a dose of 0.1 LD50 was administered. In rats killed 9 days after the last pesticide application, these changes occurred only when the highest dose of Foschlor was administered and were less intense. These changes are probably the result of metabolic disturbances caused by inhibition of non-specific esterases by Foschlor.

78-0650. Robinson, K. M. ; Yarbrough, J. D. (Dep. Zool., Mississippi State Univ., Mississippi State, MS 39762) **Liver response to oral administration of mirex in rats.** *Pestic. Biochem. Physiol.* 8(1): 65-72; 1978.

Mirex is a chemically stable organochlorine insecticide used for fire ant control. Sprague-Dawley rats were given a single oral dose of 50, 100, or 150 ppm of mirex dissovled in corn oil. Growth rates of mirex-treated and control rats were similar. Liver weight increased from 5% of body weight to approximately 6% of body weight in the first #2 days after treatment for rats given 50, 100, or 150 ppm of mirex. Maximum liver weights were approximately 6.5% at 50 ppm mirex, approximately 7.5% at 150 ppm mirex, and over 8% at 100 ppm mirex. Liver weight recovered to near control levels more rapidly when 50 ppm mirex was given than when 100 ppm or 150 ppm mirex was given. Liver lipid content was generally increased in female and castrated rats throughout the study period, but returned to control levels in male rats 28 days after treatment. Liver DNA was significantly decreased at Days 4, 7, and 14. Liver RNA was unchanged until Days 14 and 28, when it was decreased in male rats. Hepatic mirex residues (in micrograms of mirex/g liver) were 42.4 at 2 days, 23.7 at 4 days, 15.6 at 7 days, 16.8 at 14 days, and 14.4 at 28 days in male rats: values were similar in female rats. There were no significant changes in protein, glycogen, and dry weight concentrations. Levels of lactate dehydrogenase, glutamic-pyruvic transaminase, and glutamic-oxaloacetic transaminase activity did not indicate liver cell damage. Sex hormones appear to be involved in determining the magnitude of maximum liver weight, RNA concentration, and hepatic lactate dehydrogenase activity. Hepatic mirex residue correlated most closely with hepatic lipid concentration in male rats and did not correlate significantly in females.

78-0651. Pesando, D. ; Aubert, M. (C.E.R.B.O.M. (I.N.S.E.R.M.), Nice, France) **Effets des pollutions chimiques vis-a-vis de telemediateurs intervenant dans l'ecologie microbiologique et planctonique en milieu marin. 3 Partie. [Effects of chemical pollution on growth regulators of plankton and microbes in the marine milieu. Part 3.]** *Rev. Int. Oceanogr. Med.* (39/40): 109-116; 1975. (6 references) (French)

The effects of detergents, hydrocarbons, municipal and industrial effluencts, metals, lindane (pure substance, 2 mg/liter) and parathion (technical, grade, 1.25 mg/liter) on the *Peridinium trochoideum*-produced growth inhibitor of *Asterionella japonica* were studied. In the concentrations tested, lindane and parathion had no effect on the growth inhibitor.

78-0652. Urbanek-Karlowska, B. ; Fonberg-Broczek, M. (Dep. Anal. Food Useful Articles, Natl. Inst. Hyg., Warsaw, Poland) **Wplyw niedoborow bialka i kaptanu na aktywnosc fosfatazy alkalicznej i UDP-glukuronyltransferazy watroby szczurow. [Effect of protein deficiency and captan on the activity of alkaline phosphatase and UDP-glucuronyltransferase in rat liver.]** *Roczn. Panstw. Zakl. Hig.* 28(4): 345-350; 1977. (15 references) (Polish)

The hepatic alkaline phosphatase and UDP-glucuronyltransferase activity of rats kept on diets of 24%, 8%, or 4% protein and 0.1% captan for 12 weeks was studied at pH levels of 8.6 and 10.5. Results at low levels of protein (4%) showed that alkaline phosphatase activities decreased slightly at pH 8.6, but increased 2-8-fold at the higher pH of 10.5. Alkaline phosphatase activity was inhibited at the higher pH by captan. UDP-glucuronyltransferase tended to decrease in rats fed the low protein diet, and captan showed no effect on the activity of this enzyme.

78-0653. Saleh, M. A. ; Turner, W. V.; Casida, J. E. (Pestic. Chem. Toxicol Lab., Dep. Entomol. Sci. Univ. Calif., Berkeley 94720) **Polychlorobornane components of toxaphene: structure-toxicity relations and metabolic reductive dechlorination.** *Science* 198(4323): 1256-1258; 1977. (23 references)

2,2,5-endo, 6-exo,8,9,10-Heptachlorobornane and four derivatives of this heptachlorobornane, with an additional chlorine atom at position 3-exo,8,9, or 10, account for a major portion of the acute toxicity of toxaphene and for up to 23 percent of toxaphene composition as analyzed by open tubular column gas-liquid chromatography with an electron capture detector. Both in several organisms and model environmental systems and on photolysis, this heptachlorobornane undergoes facile reductive dechlorination at the geminal-dichloro group and sometimes dehydrochlorination. (Author abstract by permission. Copyright 1977 by the American Association for the Advancement of Science)

78-0654. Boylan, J. J. ; Egle, J. L.; Guzelian, P. S. (Dep. Med. Pharmacol., Med. Coll. Virginia, Richmond, VA 23298) **Cholestyramine: use as a new therapeutic approach for chlordecone (kepone) poisoning.** *Science* 199:893-895; 1978. (11 references)

Male Sprague-Dawley rats were given 40 mg/kg [^{14}C] chlordecone in solution by gastric tube. During the next 7 days, the daily excretion of chlordecone in the stool was approximately 5% of the amount of chlordecone remaining to be excreted. The rats were then treated orally with either 44% anhydrous cholestyramine or a placebo. Cholestyramine is an anion exchange resin which binds chlordecone in vitro. One day later, the amount of chlordecone excreted by rats given cholestryamine was already higher than that for those given placebo, and the difference in cumulative excretion of chlordecone increased until the experiment was stopped on day 21. All the rats had excreted about 30% of the chlordecone by day 7. By day 21 the rats given cholestryamine had excreted over 70% of the chlordecone, and those given the placebo had excreted between 50% and 60% of the chlordecone. The amounts of chlordecone in the rats' bodies agree well with these results: their bodies contained about 70% of the chlordane on day 7, between 20% and 30% in the group receiving cholestyramine and 40% and 50% in the group receiving the placebo by day 14, and slightly over 20% in rats receiving cholestyramine and about 40% in rats receiving the placebo by day 21. After 2 wk treatment with cholestyramine, [^{14}C]chlordecone concentrations ranged from 114,537 dpm/g in the liver to 1,991 dpm/g in the blood.

Comparable concentrations in rats receiving the placebo ranged from 188,684 dpm/g in the lvier to 3,794 dpm/g in the blood. Differences in chlordecone concentration between cholestyramine-treated and placebo-treated rats ranged from 52% in the stomach and small intestine and 51% in the brain to 30% in the fat.

78-0655. Khera, K. S. ; Tryphonas, L. (Bur. Chem. Saf., Food Dir., Nat. Health Welfare, Ottawa, Ontario, Canada.) **Ethylenethiourea-induced hydrocephalus: pre- and postnatal pathogenesis in offspring from rats given a single oral dose during pregnancy.** *Toxicol. Appl. Pharmacol.* 42(1): 85-97; 1977. (43 references)

Ethylenethiourea (ETU) was administered to pregnant Wistar rats as a single oral dose of 15, 30, or 45 mg/kg on Day 15 of gestation. Dams receiving 15 mg/kg gave birth to litters and raised normal offspring. The dose of 30 mg/kg had no adverse effect on external morphology, body weight, or number of pups at birth, but produced hydrocephalus and microphthalmia in 90% of the offspring (0% in controls) and they died during the first 9 weeks after birth. The anomaly consisted of thin-walled and fluid-filled cavities that occupied the position of the cerebral hemispheres. Affected pups had domed calvaria. the anomaly was recognized, grossly, on Days 6-9 of postnatal life, increased thereafter in severity and incidence, and was always fatal. Twenty-five percent of the offspring that survived 9 weeks had motor impairment, a hopping gait, and gross and histological lesions in the neuraxis. All pups from dams given 45 mg/kg died within 4 weeks of birth. Those which died within 2 days (except stillborns) had no grossly evident defects, but 90% of those dying or killed on or after Day 7 had hydrocephalus and microphthalmia. Periodic histopathologic evaluation of offspring from dams given 45 mg/kg revealed progressive necrosis in the neuraxis. The necrotic tissue was gradually replaced by an enlarging ventricular cavity, thus giving rise to communicating hydrocephalus *ex vacuo*. Cross-fostering tests revealed that the anomaly was initiated prior to nursing. (Author abstract by permission)

78-0656. Kurtz, P. J. (U.S. Army Environ. Hyg. Agency, Aberdeen Prov. Ground, MD 21010) **Dissociated behavioral and cholinesterase decrements following malathion exposure.** *Toxicol. Appl. Pharmacol.* 42(3): 589-594· 1977. (13 references)

Rat conditioned avoidance performance and erythrocyte, plasma, and brain cholinesterase activity were examined after a single intraperitoneal injection of 25, 50, 100, or 150 mg/kg of malathion. Avoidance performance was significantly impaired 1 hr after injection with 50 mg/kg, although blood and brain cholinesterase remained at greater than 90% of control values. The higher dosages (100 and 150 mg/kg) produced significant decreases in blood and brain cholinesterase activity as well as avoidance performance, but the behavioral and biochemical decrements did not necessarily coincide. The results suggest that low dosages of malathion may disrupt behavior without significantly reducing cholinesterase activity. (Author abstract by permission)

78-0657. Laska, A. L. ; Bartell, C. K.; Condie, D. B.; Brown, J. W.; Evans, R. L.; Laseter, J. L. (Cent. Bio-Organic Stud., Univ. New Orleans, New Orleans, LA 70122) **Acute and chronic effects of hexachlorobenzene and hexachlorbutadiene in red swamp crayfish (*Procambarus clarki*) and selected fish species.** *Toxicol. Appl. Pharmacol.* 43(1): 1-12; 1978. (50 references)

Red swamp crayfish (*Procambarus clarki*), sailfin mollies (*Poecilia latipinna*), Gulf killifish (*Fundulus grandis*), and largemouth black bass (*Micropeterus salmoides*) were tested for toxic responses to hexachlorobenzene (HCB) and hexachlorbutadiene (HCBD). HCB dissolved in water induced no observable effects on any test animals, whereas HCBD at concentrations of 1.2 and 4.2 mg/liter resulted in mortalities of 50% in mollies challenged within 138 and 26.5 hr, respectively. Injections of HCB dissolved in peanut oil were not acutely toxic to crayfish or Gulf killifish at a dose of 125 μg of HCB/g body weight. However, a 5-day LD50 in crayfish was 336 μg of HCBD/g body weight in injection experiments, while a 20-hr LD50 was 1700 μg/g body weight in Gulf killifish. Plasma cortisol concentrations were not significantly elevated in Gulf killifish following 10 days of exposure to 5.9 μ/liter of HCB. Higher plasma cortisol concentrations were observed in bass challenged with 31.95 μg-liter of HCBD for 10 days. (Author abstract by permission)

78-0658. Wagner, S. R. ; Greene, F. E. (Dep. Pharmacol., Milton S. Hershey Med. Cent., PA State Univ. Coll. Med., Hershey, PA 17033) **Dieldrin-induced alterations in biogenic amine content of rat brain.** *Toxicol. Appl. Pharmacol.* 43(1): 45-55; 1978. (39 references)

Male and female Sprague-Dawley rats were exposed acutely and chronically to dieldrin. The effects of the cyclodiene insecticide on central biogenic amines were determined. Severe neurotoxic signs occurred in males after a single oral dose of dieldrin (50 mg/kg); females were less affected. Overt neurotoxicity was accompanied by decreased concen'.ations of norepinephrine (NE) in whole brains at 2 and 5 hr after dosing, but the decrease was statistically significant only in males. Reductions in whole brain NE were of limited duration; no decrease occurred after 48 hr, although neurotoxic signs were evident throughout this period. The serotonin concentrations decreased in both sexes at 2 hr, at which time hypothermia was greatest. Dopamine concentrations were unchanged by acute dieldrin exposure. Rats maintained on a diet containing 50 ppm of dieldrin for up to 8 weeks were also examined for effects on central biogenic amine content. In whole brain, this level of dietary exposure caused small, inconsistent decreases in biogenic amine concentrations. However, when brain regions were analyzed, NE concentrations in the medulla oblongata + pons, striatum, and hippocampus decreased during the initial weeks of the study. With continued dieldrin feeding, NE values returned to or exceeded control values, suggesting adaptations to the depleting effects of dieldrin. No consistent differences between sexes occurred during chronic exposure to dieldrin with regard to whole brain or regional amine concentrations, or to overt neurotoxicity. (Author abstract by permission)

78-0659. Maling, H. M. ; Saul, W.; Williams, M. A.; Brown, E. A. B.; Gillette, J. R. (Lab. Chem. Pharmacol. Hypertension-Endocrine Branch, Natl. Heart, Lung, Blood Inst., Natl. Inst. Health, Bethesda, MD 20014) **Reduced body clearance as the major mechanism of the potentiation by beta-$_2$-adrenergic agonists of paraquat lethality in rats.** *Toxicol. Appl. Pharmacol.* 43(1): 57-72; 1978. (25 references)

In rats, the potentiation of paraquat toxicity by l-isoproterenol and by preferential β_2-adrenergic agonists (salbutamol, carbuterol, and fenoterol) was blocked by pretreatment with *dl*-propranolol. *l*-Propranolol and *dl*-propranolol were equally effective and *d*-propranolol was relatively ineffective. *l*-Isoproterenol and the β_2-agonists did not increase paraquat uptake by rat lung slices *in vitro*. Isoproterenol treatment *in vivo* decreased urinary excretion of paraquat during the first 2 hr and enhanced paraquat concentrations in tissues. These increased tissue concentrations were correlated with reduced body clearances of paraquat, in isoproterenol-treated rats. Isoproterenol treatment also decreased the body clearance of *N*-methyl nicotinamide (NMN) and *p*-aminohippuric acid (PAH). Since the body clearance of both acidic (PAH) and basic (NMN and paraquat) substances was decreased, it appears possible that isoproterenol caused these effects by decreasing the effective renal blood flow. (Author abstract by permission)

78-0660. Den Tonkelaar, E. M. ; Verschuuren, H. G.; Bankovska, J.; De Vries, T.; Kroes, R.; van Esch, G. J. (Lab. Toxicol., Natl. Inst. Public Health, Bilthoven, The Netherlands) **Hexachlorobenzene toxicity in pigs.** *Toxicol. Appl. Pharmacol.* 43(1): 137-145; 1978. (29 references)

A 90-day toxicity study was carried out in which pigs received 0.05, 0.5, 5.0, and 50 mg/kg/day of hexachlorobenzene (HCB). Special attention was given to the induction of porphyria and microsomal liver enzymes and the concentration of HCB in blood and tissues. Animals given the highest dose (50 mg/kg) showed clinical signs associated with porphyria and died during the experiment. At lower dosages these signs were not observed. An increased excretion of coproporphyrin was found in the 5.0- and 0.5-mg/kg groups, as well as induction of microsmoal liver enzymes accompanied by increased liver weight (at 5.0 mg/kg) and characteristic histopathological changes in the liver. The concentration of HCB in blood and tissues was elevated at all dosages. Concentrations in fat were approximately 500 times greater than those in blood, while the concentration in liver was higher than in the kidneys and brain. Under the conditions of this experiment, a no-effect level was judged to be 0.05 mg/kg/day of HCB. (Author abstract by permission)

78-0661. McConnell, E. E. ; Moore, J. A.; Dalgard, D. W. (Environ. Biol. Chem. Branch, Natl. Inst. Environ. Health Sci., Research Triangle Park, NC 27709) **Toxicity of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin in Rhesus monkeys (*Macaca mulatta*) following a single oral dose.** *Toxicol. Appl. Pharmacol.* 43(1): 175-187; 1978. (37 references)

The oral LD50 of 2,3,7,8-tetrachlorodibenzo-*p*-dioxin in female rhesus monkeys was < 70 μg/kg. Clinicopathologic signs of toxicity include weight loss, blepharitis, loss of fingernails and eyelashes, facial alopecia with acneform eruptions, mild anemia, neutrophilia, lymphopenia, and a decrease in serum cholesterol with an increase in serum triglyceride concentrations. The liver, adrenal gland, and kidneys showed an increase in relative body weight, whereas the thymus was dramatically reduced in size due to a loss of cortical lymphocytes. Histopathologic examination revealed hyperplastic and metaplastic changes in sebaceous glands, especially in the eyelid (Meibomian glands) and ear canal, along with epithelial hyperplasia in the renal pelvis, stomach, gall bladder, and bile duct. The liver was relatively normal. Loss of erythroid elements in the bone marrow resulted in an increased myeloid: erythroid ratio. The overall syndrome in monkeys was similar to that produced by some other chlorinated hydrocarbons, i.e., biphenyls and dibenzofurans. The mechanism of death was not evident; the monkeys appeared to waste away in a starvation-like manner.

78-0662. Gordon, J. J. ; Leadbeater, L.; Maidment, M. P. (Procure. Executive, Minist. Def., Chem. Def. Establ., Porton Down, Salisbury, SP4 0JQ, England) **The protection of animals against organophosphate poisoning by pretreatment with a carbamate.** *Toxicol. Appl. Pharmacol.* 43(1): 207-216; 1978. (11 references)

A number of carbamates of widely differing structure and toxicity have been tested for their ability (in conjunction with supporting treatment with atropine and an oxime, P2S) to protect guinea pigs against soman poisoning. There was no correlation between the protective activity of the carbamates and either their chemical structure or toxicity, suggesting that many factors (such as rates of absorption, distribution, metabolism, etc.) are involved in determining their protective action in addition to their ability to inhibit tissue acetylcholinesterase reversibly. The four most effective carbamates (pyridostigmine, mobam, physostigmine, and decarbofuran), which raised the LD50 of soman by a factor of about 8, were studied in more detail. The dose of carbamate was not critical, the protection being essentially constant for doses ranging from half to four times the maximum sign-free dose. The duration of the protective action of a single im injection of the carbamates was greater than 2 hr, pyridostigmine being the longest acting. Carbamate pretreatment in conjunction with therapy with aropine and P2S protected guinea pigs against poisoning by sarin, tabun, or VX. In the absence of pretreatment with a carbamate. There were marked species differences in the response to the protection afforded by carbamate pretreatment against organophosphate poisoning: Guinea pigs responded better than rabbits, whereas rats were virtually unresponsive. (Author abstract by permission)

78-0663. Mathur, D. S. (Zoological Survey of India, Jabalpur (M.P.), India) **Histopathological changes in the liver of fishes resulting from exposure to dieldrin and lindane.** *Toxicon* 13(2): 109-110; 1977.

Histopathological changes in the liver induced by exposure to lindane and dieldrin are described for the *Ophiocephalus punctatus* and *Trichogaster fasciatus*. In *Ophiocephalus punctatus* exposed to lindane the most common pathological findings were slight to moderate liver damage appearing as necrosis and atrophy. The hepatic cells were moderately vacuolated, with both large and small vacuoles. In *Trichogaster fasciatus* exposed to lindane there were well-marked cytoplasmic alterations in the liver cells. Scattered liver cells were occasionally affected by abnormalities such as margination and hypertrophy. The type of cellular degeneration in *Ophiocephalus punctatus* exposed to dieldrin was most commonly a vacuolar degeneration of the cytoplasm. Necrosis was localized. The same type of cellular degeneration was most common in *Trichogaster fasciatus* exposed to dieldrin. There was marked, but localized, necrosis.

78-0664. Olefir, A. I. ; Mintser, O. P. (Kiev. Sci. Res. Inst. Indust. Hyg. Occup. Dis.) **O zavisimosti narushenii estestvennoi rezistentnosti organizma ot intensivnosti vozdeistviia pestitsidov. [Natural immunity of the organism as a function of the intensity of pesticide exposure.]** *Vrach. Delo.* 9: 121-123; 1977. (11 references) (Russian)

The natural immunity of white rats treated with 1/20-1/1000 LD50 doses of carbophos (malathion), polychloropinene (strobane), karathane, (dinocap) carbaryl, molinate, and TMTD daily (thiram) for 4.5 months was studied. An inverse relationship was found between the serum complement-fixing activity and lysozyme level, the immunological function of the reticuloendothelial system, neutrophils, skin and mucosa on one hand and the intensity of exposure to the pesticides. Most parameters of the nonspecific immunity however, showed, only insignificant changes. The specific loading test (oral administration of 1/5 LD50 of the same pesticide) and the nonspecific loading test (administration of pyrogenal) at the end of the experiment showed no significant differences from the controls for the groups treated with 1/100-1/1000 LD50 of carbaryl, molinate, carbophos, karathione and polychloropinene, or with 0.25-0.025 of LD50 of TMTD (total dose).

78-0665. Avezov, S. R. (Uzbek Veterinary Research Institute, USSR) **Toksikologicheskaia otsenka produktov uboia zhivotnykh pri otravlenii bazudinom. [Toxicologic evaluation of animal products after basudin (diazinon) poisoning.]** *Veterinariya* 8: 105-106; 1977. (Russian)

Ten young karakul sheep were poisoned with a single 225 mg/kg oral dose of diazinon. The first symptoms of poisoning appeared after 2.5-3 hours; they included salivation, miosis, bronchial spasm, muscular weakness, tremor and paresis of the extremities, and pollakiuria. All animals survived. They were killed 1-22 days after poisoning for the toxicological, biochemical and organoleptic assessment of their meat. The meat of sheep killed within the first 4 days was exsanguinated poorly, and its broth was turbid and had an unpleasant odor. No difference was seen from the control, if the animals were killed on the 5th day. The benzidine test was strongly negative, the formol and color tests positive for the meat of animals killed on the 1st day, which indicates the inhibition of peroxidase and high polypeptide and amino acid levels. A diazinon residue level of 0.64 mg/kg was found in the fat of animals killed on the 18th day, but no residues were found on the 22nd day. Cold storage for 3 months, boiling for 2.2 hours and roasting for 1 hour had low efficiency in terms of the elimination of the residues. White rats were fed daily 50 mg/kg of meat containing 0.78-10.2 mg/kg diazinon for 10 days. Diazinon caused a 50-59% inhibition of acetylcholinesterase in the rats, and the residue level in the muscles was 0.05-0.08 μg/g. The findings indicate that sheep must not be slaughtered for human consumption before the 22nd day after acute poisoning with diazinon.

78-0666. Isamov, N. N. ; Baimuradov, T. B.; Bogdanov, V. M.; Riasnianskii, I. V.; Nezametdinov, S. A.; Khaitov, V. R. (Uzbek Veterinary Research Institute, USSR) **Sostoianie eritrotsitov ovets, otravlennykh FOS. [Status of the erythrocytes in sheep poisoned with organophosphorus pesticides.]** *Veterinariya* 10: 99-100; 1977. (Russian)

The effects of anthio (formothion), ricid and diazinon on the survival and metabolic activity of peripheral blood lymphocytes were studied in sheep. The metabolic activity was studied by determining the incorporation of ^{35}S-methionine, sodium ^{35}S-sulfate and sodium ^{32}P-phosphate. All preparations were given orally (anthio: 9 mg/kg/day for 5 days or 45 mg/kg/day for 2 days; ricid: 2, 5 or 7 mg/kg/day for 3 months or 10 mg/kg qod for 1.5 months; diazinon: 2, 4, 8 or 12 mg/kg/day for 3 months). All pesticides tested considerably reduced the survival time of the erythrocytes and the metabolic processes which involve phosphorus and sulfur compared with the control. In the experiments with anthio these changes were seen only after the termination of the poisoning. A dose-effect relationship was observed.

78-0667. Kokhtiuk, F. P. ; Sukhomlinova, G. K. (All-Union Institute of Experimental Veterinary Medicine, USSR) **Diagnostika otravleniia kur gardonoi. [Diagnosis of poisoning by gardona in chickens.]** *Veterinariya* 10: 101-102; 1977. (Russian)

The acute toxicity of gardona (tetrachlorvinphos) was studied in chickens. The acute oral LD50 was found to be 1,550 mg/kg, with LD = 1,000 mg/kg and LD100 = 2,200 mg/kg. Dysfunction of the central nervous system, miosis, motor dyscoordination, general depression, pareses, ataxia, adynamia, bronchial spasm, and catarrhal hemorrhagic enteritis were the symptoms of acute poisoning. The animals died within 48-72 hr after the administration of gardona, while the surviving animals recovered in 4-5 days. The acetylcholinesterase inhibition reached its maximum at 74% 44 hours after poisoning with one LD50. Poisoning with LD0 caused 70.7% inhibition after 48 hours. The enzyme activity returned to the normal level in 15 days. Pronounced hyperemia and edema of the brain and parenchymatous organs, and venous statis, diapedesis, granular and fatty degeneration, and necrobiosis were seen in the liver, kidneys and lungs.

Residues of gardona and 2-4 unidentified metabolites were found in the gastric mucosa, gizzards, liver, kidneys, muscles, blood, brain, testes, and feces. The residue levels were highest in the feces (28.8 mg/kg) and kidneys (25 mg/kg) after 24 hours, and in the gastric mucosa (56.2 mg/kg) and feces (1.1 mg/kg) after 72 hours. The residue analyses revealed that poultry poisoned with gardona must not be slaughtered for human consumption before the expiration of 15 days.

78-0668. Kanaev, A. I. ; Grishchenko, L. I.; Trondina, G. A.; Verkhovskii, A. P. (All-Union Inst. Exp. Vet. Med. USSR) **Diagnostika otravlenii ryb ftalofosom. [Diagnosis of phthalophos (phosmet) poisoning in fish.]** *Veterinariya* 10: 103-104; 1977. (Russian)

The toxicity and accumulation of phthalophos in young carp and other fish were studied in aquariums. The LC50 was found to be 4.4-4.8 mg/liter for the different species. There were no deaths among carp kept in water with 1/50 LC50. Depression, disorientation, increased intestinal peristalis, loss of appetite, motor dyscoordination, tremor and spasms of the skeletal muscles, adynamia, paralysis, and depression of respiration were the symptoms of acute poisoning. Chronic poisoning with 1/5-1/10 of LC50 caused loss of appetite, depression, loss of equilibrium, and spasms of the skeletal muscles. Acute and chronic poisoning caused reduction of the hemoglobin level by 17%, of the erythrocyte count by 55.3%, of the hematocrit value by 13.1%, leukopenia, and vaculization of the cytoplasm of the erythrocytes. Acute and chronic poisoning caused inhibition of the acetylcholinesterase activity by 87.4-89% in the blood and by 41-85.6% in the brain. In chronic poisoning, considerable enzyme inhibition was seen even in the absence of clinical symptoms of poisoning. The residue levels after acute poisoning were 16.6 mg/kg in the kidneys, 14.6 mg/kg in the blood, 10.3 mg/kg in the intestinal wall, and 8 mg/kg in the muscles. No residues were found in the fish 8 days after poisoning, but phthalophos peristed for 4 months in deep-frozen meat.

78-0669. Grigor'eva, N. N. (Kiev Scientific Research Institute of Food Hygiene, Kiev, USSR) **Deistvie polikhlorpinena na koru nadpochechnikov. [Effect of polychloropinene on the adrenal cortex.]** *Vrach. Delo* (9): 125-127; 1977. (Russian)

Morphological and histochemical changes in the adrenal cortex were studied in rats treated with polychloropinene (strobane) in a single intragastric dose of 350 mg/kg (LD50) or with 1/10 and 1/100 LD50 doses for 10 months. Hyperemia of the cortical and medullary layers, increase of the thickness of the cortical layer, enlarged, and sometimes binucleate cells, increased nucleic acid level, and reduced lipid level were seen during the first days after acute poisoning. Reduction of the relative weight of the adrenal gland, reduction of the thickness of the cortex, hemorrhages, regressive cellular changes including necrosis, thickening of the argyrophil fibers of the vessel walls and stroma of the adrenal gland, reduced nucleic acid concentration, and increased mucopolysaccharide and lipid levels were seen 5-10 days after poisoning. Similar histochemical changes were seen during chronic poisoning, which is indicative of hypofunction of the adrenal gland, but morphological changes appeared only 3-4 mo from the beginning of the treatment. The changes were correlated with the dose and length of treatment.

78-0670. Turusov, V. S. ; Lanko, N. S.; Bazlova, L. S. (Lab. Carcinogenic Substances, Oncol. Res. Center, USSR Acad. Medical Sciences, Moscow, USSR) **1,2-Dimethylhydrazine induced tumors in CBA line mice.** *Vopr. Onkol.* 23(7): 39-43; 1977. (13 references) (Russian)

The carcinogenic effect of 1,2-dimethylhydrazine (8 mg/kg, sc. 1x/wk), administered with or without trichlorfon (0.04% in drinking water) for 38-40 wk, was studied in 2-3-mo-old BCA mice. In the group treated with 1,2-dimethylhydrazine and trichlorfon, the first tumors appeared after 22-25 wk, and in the group treated with 1,2-dimethylhydrazine only 5-8 wk later. Otherwise, trichlorfon had no influence on the incidence and localization of the tumors induced, nor was it carcinogenic when administered alone. All but one of the 43 mice developed tumors, most of which were multiple. Uterine tumors (endometrial sarcomas, tumors with myometrial and vascular components) were found in 28, intestinal tumors in 26, anal tumors (squamous cell or squamous-basal cell carcinomas, small sebaceous adenomas and small basal-cell tumors) in 26, hemangioendotheliomas of the liver in 15, ovarian angiomas in 4, fibrous polyposis of the forestomach, pulmonary hemangioendothelioma, reticulum-cell sarcoma of the large intestine, and renal adenoma in 3 animals. The findings indicate that 1,2-dimethylhydrazine appears to be a more polytropic carcinogen in CBA mice than in rats.

78-0671. Muller, W. ; Schewe, T.; Lyr, H.; Zanke, D. (Inst. Physiol., Biol. Chem., Humboldt-Univ., DDR-104 Berlin, Hessische Strasse 3/4, E. Germany) **Wirkmechanismus der Atmungshemmung durch die Systemfungicide der Carboxingruppe. Wirkung von Oxathiinderivaten und -analoga auf nichtphosphorylierende submitochondriale Partikeln aus Rinderherz sowie *Trametes versicolor* und *Trichoderma viride* . [Action mechanism of respiratory inhibition by systemic fungicides of the carboxin group. Effects of oxathiine derivatives and analogs on non-phosphorylating submitochondrial particles from beef heart, *Trametes versicolor*, and *Trichoderma viride*.]** *Z. Allg. Mikrobiol.* 17(5): 359-372; 1977. (40 references)

Twenty-three derivatives and structural analogs of carboxin (5,6-dihydro- 2-methyl- 1,4-oxathiin- 3-carboxanilide) were tested in the succinate-cytochrome c-oxidoreductase (SCO) system and in the NADH-oxidase system of non-phosphorylating electron transport particles (ETP) from beef heart mitochondria. Some compounds were also tested on particulate succinate dehydrogenase from carboxin-sensitive *Trametes versicolor* and from carboxin-insensitive *Trichoderma viride*. The data obtained for the respiratory inhibitiory action of these compounds show that

their activities in the SCO system from beef heart ETP correlate highly significantly with their effects on particulate succinate dehydrogenase from *Tr. versicolor*, but not from *Tr. viride*. Beef heart ETP is consequently a suitable model for the carboxin receptor in carboxin-sensitive fungi. A multicentric mechanism is suggested for the binding of carboxin on the receptor in the succinate dehydrogenase region of the electron transport system, with the involvement of the following centers: one electrophilic center on the C_2 atom of the oxathiine ring, one nucleophilic center each on the 0 atom and the N atom of the acid amide group, and two hydrophobic centers (the phenyl radical of the anilide group and the CH_3 group of the oxathiine ring). The S atom exerts a stabilizing effect on the active agent-receptor complex. The insensitivity of certain fungal species to carboxin is probably due to a different structure of the succinate dehydrogenase complex.

See also **78-0521** **78-0533**

78-0672. Kuehl, D. W. ; Leonard, E. N. (U.S. Environ. Prot. Agency, Environ. Res. Lab.,Duluth, Duluth, MN 55804) **Isolation of xenobiotic chemicals from tissue samples by gel permeation chromatography.** *Anal. Chem.* 50(1): 182-185; 1978. (10 references)

An efficient, rapid method for the isolation of low molecular weight polar organics in fatty tissue for subsequent gas-liquid chromatographic (GLC)-mass spectrometric (MS) analysis is described. Gel preparation chromatography retention volume and recovery data for various compounds, many of which are used as pesticides, are given. Recoveries better than 95% are reported for PCB's. Some disadvantages are seen in low recoveries of only 10% for such polar organics as pentachlorophenol. On this system, however, a mixture of equal quantities of corn oil, Aroclor 1254, and pentachlorophenol can be separated completely. Excellent resolution can therefore be expected if low recoveries of the polar chemicals are considered acceptable.

78-0673. Melcher, R. G. ; Garner, W. L.; Severs, L. W.; Vaccaro, J. R. (Anal. Ind. Hyg. Lab., Dow Chemical U.S.A., Midland, MI 48640) **Collection of chlorpyrifos and other pesticides in air on chemically bonded sorbents.** *Anal. Chem.* 50(2): 251-255; 1978. (13 references)

A procedure is described for the collection and determination of chlorpyrifos [*O,O*-diethyl *O*-(3,5,6-trichloro- 2-pyridyl)- phosphorothioate] in air at the low parts per trillion level for sampling periods of 10 min up to 16 h. Worker breathing zone or area samples are collected by pumping air through a small tube containing a chemically bonded sorbent, GC Durapak-Carbowax 400/Porasil F. Samples are analyzed by desorption in diethyl ether and injection into a gas chromatograph equipped with a Poly I-110 column and an electron capture detector. Preliminary results for ronnel, lindane, carbaryl and diazinon indicate applicability of this technique to a wide range of pesticides. (Author abstract reprinted by permission of the American Chemical Society)

78-0674. Moye, H. A. ; Scherer, S. J.; St John, P. A. (Food Sci. Dep., Univ. Florida, Gainsville, FL 32611) **Dynamic fluorogenic labelling of pesticides for high performance liquid chromatography: detection of *N*-methylcarbamates with o-phthaladehyde.** *Anal. Lett.* 10(13): 1049-1073; 1977. (9 references)

A post-column fluorogenic labeling reaction between *o*-phthalaldehyde (OPA) and methylamine, a hydrolysis product of the *N*-methylcarbamate and carbamoyl oxime pesticides, is described for detection by high performance liquid chromatography of these pesticides. The modular fluorometric HPLC system consisted mainly of a fluorometer equipped with a flow through cell. Stock OPA solutions were prepared by dissolving 1 g in 10 ml of dioxane, dilution to 1 liter with borate buffer, and adding 1 ml of mercaptoethanol. Pesticide grade dioxane was used for the mobile phase. An Aminco Aminalyzer HPLC system was also used. The solvent system used was water-dioxane, with 0.005 *M* formic acid and 0.025% Brij 35 detergent, and step gradients in percentage dioxane were: 5%, 3 min; 10%, 4 min; 20%, 3 min; and 40%, 10 min. Baygon (propoxur), lannate (methyl), temik (aldicarb), carbofuran, and mesurol (methiocarb) had an initial intensity less than 10.0, which increased to 100.0 or more after an incubation period of about 5 min, after which increases in intensity leveled off. Matacil (aminocarb) behaved similarly except that the intensity decreased somewhat between 15 and 30 min of incubation. The initial intensity for carbaryl was over 100.0, and increases were small. Standard 25 microliter injections of carbaryl at various flow rates were used to determine the bandspreading contributions of both coil and cell. Bandspreading contributions, in chromatographic peak width at base, due to the fluorometer cell varied from 4 sec at a flow rate of approximately 4.5 ml/min to 12 sec at approximately 1.3 ml/min. The contribution from the coil increased gradually, from about 7 sec to about 16 sec, as the flow rate decreased from 4.5 ml/min to about 2.3 ml/min, then more steeply, from 16 sec to about 34 sec, as flow decreased to about 1.1 ml/min. Total bandspreading followed a similar pattern, increasing from about 9 sec to 20 sec as flow decreased from 4.5 to about 2.1 ml/min, then increasing to about 38 sec as flow decreased to about 1.1 ml/min. With a NaOH flow of 0.1 ml/min the signal to noise ratio is not affected significantly as OPA is varied from 0.2 to 0.5 ml/min, unlike NaOH flows of 0.3 and 0.5 ml/min. Analytical curves were linear for amounts ranging from approximately 5 ng/25 microliters. Carbaryl produced the highest peak for each quantity, followed by lannate, carbofuran, mesurol, baygon, and temik.

78-0675. Thibeau, R. J. ; van Haverbeke, L.; Brown, C. W. (Dep. Chem., Univ. Rhode Island, Kingston, RI 02881) **Detection of water pollutants by laser excited resonance Raman spectroscopy; pesticides and fungicides.** *Appl. Spectrosc.* 32(1): 98-100; 1978. (8 references)

The feasibility of resonance Raman spectroscopy in the detection of hazardous chemicals in water was tested on 2-nitrophenol, 2,4-dinitrophenol, Ditrosol, methyl parathion, Dichloran, and Dinoseb. Excitation was provided by an argon ion laser, and both the 488.0 nm and 457-9 nm laser lines were used. Similar results were obtained with both lines. The relative height of the solute Raman bands vs. the height of the 1640 cm^{-1} water band was larger for 457.9 nm excitation, because this line was closer to the absorption maxima. Minimum detectable concentrations were 0.8 ppm 2-nitrophenol, 0.7 ppm 2,4-dinitrophenol, 0.9 ppm Ditrosol, 7.0 ppm methyl parathion 0.4 ppm Dichloran, and 0.5 ppm Dinoseb. Dinoseb was added to a sample of river water, resulting in a 3 ppm final concentration. Despite considerable fluorescence attributed to other compounds already present in the sample, the Raman bands for Dinoseb at 943, 1272, and 1327 cm^{-1} were clearly visible.

78-0676. Iwata, Y. ; Spear, R. C.; Knaak, J. B.; Foster, R. J. (Dep. Entomol., Univ. Calif., Riverside CA 92521) **Worker reentry into pesticide-treated crops. I. Procedure for the determination of dislodgable pesticide residues on foliage.**

Bull. Environ. Contam. Toxicol. 18(6): 649-655; 1977. (9 references)

The main points of the dislodgeable foliar residue procedure for the determination of dislodgeable pesticide residues on foliage are reviewed. Collection of leaf disc samples of fixed diameter has proven to be a reliable sampling technique. A schematic diagram of a leaf punch sampler which has been found satisfactory is presented. An adequate sample contians 40 or more leaf discs. The leaves should be free of excess moisture. For citrus, leaf discs should be taken near the centers of the fully-mature, second-cycle leaves. For noncitrus crops, samples are taken from areas of average thickness from healthy, average-sized leaves. The entire circumference of the tree should be represented. If leaf discs are not feasible, entire leaves may be sampled. The leaves sampled should represent the foliage that workers are most likely to contact, and use of a ladder for sampling should be avoided. Depending on the user's need, samples should be collected to fairly represent either the entire plant population or a small, defined segment of the field. In the first case, knowledge of the application procedures is vital. For spot-checking residue levels in a large number of fields, a minimum of two replicate samples should be taken from the area of interest. Collected samples should be kept cool. For removing dislodgeable residues, the leaf disc sample should be shaken with water containing an effective wetting agent, then extracted from the aqueous wash into an organic solvent. Final results for the dislodgeable residues should be expressed in units of μg of the compound per cm^2 of leaf area.

78-0677. Spencer, W. F. ; Kilgore, W. W.; Iwata, Y.; Knaak, J. B. (U.S. Dep. Agric., Riverside, CA 92521) **Worker reentry into pesticide-treated crops. II. Precedures for the determination of pesticide residues on the soils surface.** *Bull. Environ. Contam. Toxicol.* 18(6): 656-662; 1977. (5 references)

A protocol is suggested for monitoring soil pesticide residues within the work environment in relation to worker reentry. Two types of samples are suggested: soil dust obtained by vacuuming the soil surface; and soil plugs obtained from the surface 1 cm of soil. The soil dust procedure is preferred and should be used in most cases, but either procedure can be used to monitor the work environment or evaluate the persistence of pesticides by periodic sampling following application. With the soil dust procedure, the screened samples are weighed, extracted in a Soxhlet apparatus, and analyzed using gas chromatography. Results should be reported in micrograms per gram of dust and as micrograms per square centimeter of soil surface; amounts of dust per unit area should also be reported. The soil plugs method might be useful in areas where the soil is moist or where a cover crop precludes obtaining dust samples. The samples are weighed, seived, and small sticks and other plant material chopped up and retunred to the sample. The samples are then extracted in a Soxhlet extractor and analyzed by gas chromatography. All residue results are calculated on the basis of oven dry soil weights. Results should be expressed in micrograms per gram of soil (ppm) and as micrograms per square centimeter of soil surface.

78-0678. Barry, T. L. ; Gretch, F. M.; Rosen, J. D. (Food Drug Admin., 850 Third Ave., Brooklyn, NY 11232) **Identification of pentachlorobenzonitrile residues in field crops.** *Bull. Environ. Contam. Toxicol.* 18(6): 691-696; 1977. (6 references)

Several carrot extracts were analyzed for identification of a material with a gas-liquid chromatographic (GLC) retention time inconsistent with that of any known pesticide. The material was eluted from Florisil with 15% ether in petroleum ether. A Pye 104 gas chromatograph interfaced to an AEI MS-30 Double Beam Mass Spectrometer by means of a silicone membrane separator was used for analysis. The data was acquired with an AEI DS=50 DB data system. A Tracor Model 222 gas chromatograph equipped with a Ni-63 electron capture detector and glass columns packed with 10% OV-101 and a mixture of 15% OV-210 and 10% OV-101 on Chromosorb WHP was used for determinations of retention time and recovery. The carrot samples were found to contain approximately 20 ppb of pentachlorobenzonitrile, a material which is not an approved pesticide nor an industrial chemical of known usage. However, this compound is a known impurity of the pesticide chlorothalonil and may be present in quantities of up to 2%. Although chlorothalonil was not detected in the eluates from the carrot samples, it was later detected in celery samples from a different grower in the same geographic region. Relative retention times (aldrin = 1.00) for pentachlorobenzonitrile were 0.5 and 0.66 on the two columns, and the material appeared to be approximately twice as sensitive as heptachlor epoxide under these conditions.

78-0679. Popendorf, W. J. ; Leffingwell, J. T. (Sch. Public Health, Univ. Calif., Berkeley, CA 94720) **Procedures for the determination of dislogeable dust on foliage as related to worker reentry hazards.** *Bull. Environ. Contam. Toxicol.* 18(6): 787-788; 1977. (7 references)

Procedures are outlined which represent an extension of the dislodgeable foliar residue method. After the organic solvent has been drained from the separatory funnel in step 7 of the dislodgeable method, a desiccated, preweighed, 4.25-cm glass-fiber filter in an appropriate holder (e.g., the Millipore 300-ml sintered-glass, vacuum filtration apparatus) can be ussed to quantitatively collect the foliar dust. To correct for the weight of the fibrous foliar debris which may arise from the punching process, leaf discs from leaves previously cleaned of all foliar dust should be used as control samples. The coefficient of variation for single samples is approximately 10%, and, as in the basic dislodgeable procedure, the weight determination of at least two replicate samples is recommended. Duplicate samples taken 1 wk apart would minimally represent leaf conditions during the interim. A much larger proportion of samples collected as part of human exposure investigations should be analyzed for dust levels to maximize the points of comparison with aerosol concentrations and to verify other exposure parameters.

78-0680. Syoyama, M. (Criminol. Lab., Aichi Prefectural Police H.Q., 2-1-1, Sanno-maru, Naka-ku, Nagoya-shi, Ai-

chi, Japan) **[Classification procedure for rapid identification of insecticides by thin-layer and gas chromatography.]** *Bunseki Kagaku (Jpn. Anal.)* 26(7): 502; 1977. (Japanese)

A rapid assay scheme for the rapid identification of 58 insecticides by TLC and GLC is discussed. The insecticides have been catagorized into eight divisions by *Rf* values and differences in coloration. The chromogenic reagents used are sodium carbonate, Gibbs reagent, lead chloride, *o*-tolidine, sulfuric acid, and tetrabromophenylphthalein ethyl ester. The eight divisions are parathion and derivatives, phenylcarbamates, phenylcarbamate-organophosphate mixtures, organochlorine compounds, bis(*p*-chlorophenyl) carbinols, chlorinated organophosphates, chlorinated organothiophosphates, and nonchlorinated organothiophosphates. All insecticides except the phenylcarbamates can be analyzed satisfactorily on the gas chromatograph under the same operating conditions.

78-0681. Wislowska, E. ; Kostowska, B. (Dep. Ecol. Weed Control, Inst. Plant Cult. Fert. Soil Sci., Wroclaw, Poland) **Oznaczanie pozostalosci herbicydow triazynowych w wodzie metoda chromatografii cienkowarstwowej. [Determination of triazine herbicide residues in water by thin layer chromatography.]** *Chem. Anal. (Warsaw)* 22(5): 975-978; 1977. (8 references) (Polish)

Thin layer chromatography was used to analyze triazine herbicide residues in water. A mixture of hexane and ethyl ether was used to extract the water. Thin layer chromatography with silica gel G was used to determine the residue level. The method recovered 90 to 94% of the residues. The limit of detection was 0.003 to 0.006 ppm, and the sensitivity was 0.05 to 0.1 microgram. Mean standard deviation was 0.7 to 1.3%.

78-0682. Wislowska, E. ; Kostowska, B. ((Dep. Ecol. Weed Control, Inst. Crop Sci., 50-539 Wroclaw, Poland) **Oznaczanie pozostalosci chlorku chlorocholiny w slomie i ziarnie pszenicy metoda chromatografii cienkowarstowowej. [Determination of chlorocholine chloride residues in grain and straw of wheat by thin-layer chromatography.]** *Chem. Anal. (Warsaw)* 22(5): 979-983; 1977. (5 references) (Polish)

A thin-layer chromatographic method for the determination of chlorocholine chloride (chlormequat chloride, CCC) residues in wheat straw and grains is described. Following extraction with absolute ethanol by heating for 4 hours under reflux, the extract is cleaned up on a Dowex 50 W x 5 (50-100 mesh) cation exchanger, and the active agent is eluted with 6.5% HCl. Determination is done on silica gel G using Dragendorff's reagent. The recovery rates are 63-69% for grains and 83-89% for straw. The relative standard deviations are 5% for grains and 3% for straw. The sensitivity and limit of detection (with regard to the recovery rate) is 0.6 μg of CCC.

78-0683. Stijve, T. (Control Lab., Nestle Products Tech. Assistance Co. Ltd., La tour-de-Peilz, Switzerland) **Improved method for the gas chromatographic determination of inorganic bromide residues in foodstuffs fumigated with methyl bromide.** *Dtsch. Lebensm. Rundsch.* 73(10): 321-325; 1977. (13 references)

An improved method for the gas chromatographic determination of inorganic bromide residues in foodstuffs fumigated with methyl bromide is presented. In this method the residue is derivatized to ethylene bromohydrin by treatment of the acid sample slurry with ethylene oxide. Thus obtained, the derivative is extracted with ethyl acetate and determined by gas liquid chromatography with an electron capture detector. Recoveries for inorganic bromide added to various substrates ranged from 82 to 120% at levels ranging from 5 to 500 ppm. Essentially the same results are obtained with this method as with the classic colorimetric procedures. The bromide contents of 353 samples of different foodstuffs including dehydrated vegetables, cereals, dried fruits and mushrooms were determined by this method. Most fumigated products had a bromide concentration of less than 50 mg/kg. High levels (up to 1550 mg/kg) were found in dried mushrooms, notably in *Boletus edulis*.

78-0684. Lisovik, Zh. A. ; Gorbacheva, N. A. (Russian Ther. Cen. of Acute Poisonings, Sklifosovskii Inst. of Emergency Aid, Moscow, USSR) **Gazokhromatograficheskoe opredelenie metafosa, metilnitrofosa i metiletiltiofosa v krovi. [Gas chromatographic determination of metaphos, nitrophos and methylethylthiophos in blood.]** *Farmatsiya* 26(5): 44-51; 1977. (5 references) (Russian)

A gas-chromatographic method for the quantitative determination of metaphos methyl parathion, methylnitrophos (fenitrothion) and methylethylthiophos (methylethyl paration) in human blood and peritoneal fluid obtained during peritoneal dialysis is described. Following extraction with hexane, centrifugation at 3,000 rpm and decantation, dissolution in hexane and concentration in a rotary evaporator at 20°C and 0.80 kp/cm² pressure, determination is done by means of a gas chromatograph with a SE-30-packed column and a thermionic detector. The sensitivity is 0.002 mg%; the recovery rate is 94.6-98.7% for metaphos, 94-96.1% for menthylnitrophos, and 96-98.8% for methylethylnitrophos in peritoneal fluid, and 80.4-89.3%, 81.6-88.4%, and 85.1-89.1%, respectively, in blood. The recovery rate decreases with the time elapsed after blood sampling. Therefore, the analysis should be performed as soon as possible. Substances present in commercial preparations of these pesticides (xylene, dichloroethane, vaseline and mineral oils, white spirit, emulsifiers); other organophosphorus pesticides, such as malathion, ronnel, trichlorfon dichlorvos, DEF, formothion, tetrachlorvinphos, diazinon, naled, coumaphos, demeton, menazon, phosalone, phosmet, cidial, and ciodrin, as well as the therapeutic drugs administered to patients poisoned with metaphos, methylnitrophos and methylethylthiophos are all free from interfering with the gas-chromatographic determination.

78-0685. Stan, H.-J. ; Abraham, B.; Jung, J.; Kellert, M.; Steinland, K. (Inst. Lebensmittelchem. Techn. Univ. Berlin,

D-1000 Berlin 12) **[Detection of organophosphorus insecticides by gas chromatography/mass spectrometry.]** *Fresenius Z. Anal. Chem.* 287(4/5): 271-285; 1977. (15 references) (German)

The electron impact mass spectra (EI-MS) of 49 organophosphorus insecticides were measured in the GC-MS mode under conditions generally used in residue analysis. The EI-MS of compounds of the four chemical classes phosphorodithioates, phosphorothionates, phosphorothiolates, and phosphates were further divided into the groups of dimethyl esters and diethyl esters. For these eight chemical groups the five ions at m/e 93, 97, 109, 121, and 125 were found to be indicative of the corresponding structure. With these five fragments individual compounds can be classified into the different structure groups. In addition to these group typical ions, for each of the 49 pesticides a series of ions was selected which are characteristic for each individual pesticide, allowing an unequivocal identification of these compounds in residue analysis. The choice of the ions characteristic for individual pesticides is discussed, accentuating the question of whether the same ions may be found in the EI-MS of other organophosphorus pesticides. As an identification procedure GC-MS with single ion detection and multiple ion detection in combination with the retention time and the positive response of the alkali flame detector is discussed. (Author abstract by permission)

78-0686. Khorozhanskaia, F. P. (Leningrad Municipal Disinfection Station, Leningrad, USSR) **Kachestvennoe opredelenie khlorofosa na obrabotannykh poverkhnostiakh. [Qualitative determination of trichlorfon on treated surfaces.]** *Gig. Sanit.* (10): 85-86; 1977. (1 reference) (Russian)

A rapid colorimetric method for the routine identification of trichlorfon on treated surfaces is described. A sample is taken by means of a cotton swab soaked with a sodium hydroxide solution of hydrogen peroxide. The concentration of the solution is 2-4%. A few drops of *o*-tolidine in acetone are dropped on the swab. The presence of trichlorfon is indicated by the orange coloration of the cotton. The maximum color intensity is reached in 2-3 minutes.

78-0687. Lonnes, P. (Interpoll Inc., St. Paul., MN) **High volume sorbent sampling for pesticide analysis.** *HEW publication No. 76-193, Second NIOSH Solid Sorbents Roundtable*, NIOSH, Cincinnati, Ohio; U. S. GPO, Washington, D.C.; 1976. (6 references)

The primary objective of this study was to develop a low energy dry sampling system for collection of low concentrations of alkyl phosphonates in the air, so that enough material could be collected in a short time for an analysis by either infrared or mass spectrometric techniques. Samples were also to be easily recoverable once collected. The collection substrate also had to have the necessary physical characteristics so that it could be made with a low enough resistance to flow to meet the energy requirements. The sampling substrate developed provides a means of efficiently sampling large volumes of air for organic vapors present at the ppb level. The technique was originally conceived for ambient air sampling to collect samples useable for subsequent physicochemical identification tests. However, it is suggested that the method could be modified so that it could have widespread application in industrial hygiene and occupational safety. The development of the filter-like high volume adsorbent system is described in detail.

78-0688. Bowman, M. C. ; Holder, C. L.; Rushing, L. G. (Dep. Health, Educ. Welfare, Food Drug Admin. Natl. Cent. Toxicol. Res., Jefferson, AR 72079) **Trace analysis of etrimfos and two degradation products in corn and alfalfa.** *J. Agric. Food Chem.* 26(1): 35-42; 1978. (13 references)

A method was devised for determining residues of etrimfos [*O,O*-dimethyl *O*-(6-ethoxy- 2-ethyl- 4-pyrimidinyl) phosphorothioate], its O analogue, and its hydrolysis product in corn and alfalfa at levels of about 10 ppb or less. Salient elements of the procedure include Soxhlet extraction of the residues overnight with dichloromethane-10% methanol, preliminary cleanup on a column of Sephadex LH-20, separation of the three compounds on a silica gel column, and further cleanup of the hydrolysis product by liquid-liquid partitioning. The parent and O analogue fractions are separately analyzed by using gas chromatography with either a flame photometric detector sensitive to phosphorus or a rubidium-sensitized nitrogen-phosphorus detector. The hydrolysis product is analyzed directly by high-pressure liquid chromatography or converted to a pentafluorobenzoate derivative and assayed by electron-capture gas chromatography. Ancillary analytical chemical data and information concerning the efficiency of extracting field-weathered residues from corn were obtained and anticholinesterase activity and lethality data for etrimfos and the O analogue are also presented. (Author abstract reprinted by permission of the American Chemical Society)

78-0689. Argauer, R. F. ; Feldmesser, J. (Agric. Res. Serv., U.S. Dep. Agric., Beltsville, MD 20705) **Uptake of ethoprop (Mocap) by ten vegetables grown in soil treated for control of nematodes.** *J. Agric. Food Chem.* 26(1): 42-45; 1978. (4 references)

An analytical method was developed for the analysis of the nematocide ethoprop (*O*-ethyl *S,S*-dipropyl phosphorodithioate) in vegetable crops. The method was rapid and efficient with recoveries nearly 100% for samples fortified at levels as low as 0.01 ppm. Ethoprop was found at harvest at levels above 0.01 ppm in onion (0.12, 0.52, 1.34 ppm), carrot (0.14, 0.34, 0.81 ppm), radish (0.12, 0.33, 0.66 ppm), and eggplant (0.027, 0.044, 0.086 ppm) which were grown in soil treated 1 week before planting with 30, 60, and 120 lb of ethoprop 10% granules/acre (3.4, 6.7, 13.4 kg/ha active ingredient). Ethoprop was not detected (< 0.01 ppm) in beet, cabbage, cantaloupe, pea, and tomato. Skin, core, or roots of certain selected vegetables sampled had higher concentrations of ethoprop than had the whole vegetable. (Author abstract reprinted by permission of the American Chemical Society)

78-0690. Selim, S. ; Cook, R. F. (HEW-FDA, Washington, D. C. 20204) **Residue determination of a dioxane herbicide in soil and soybeans by high-pressure liquid chromatography.** *J. Agric. Food Chem.* 26(1): 106-110; 1978. (10 references)

A method is described for the determination of residues of FMC 25213 [*r*-2-ethyl- 5-methyl- *c*-5-(2-methylbenzyloxy)- 1,3-dioxane] in soil, soybeans, soybean forage, and soybean hay. Residues of FMC 25213 are first extracted from the sample with methanol-water and subsequently partitioned in methylene chloride. After being partitioned with sodium bisulfite, the methylene chloride extract is concentrated and added to a silica gel clean-up column. Acid hydrolysis of FMC 25213 releases propionaldehyde, which is distilled into a solution of 2,4-dinitrophenylhydrazine to form the corresponding hydrazone. Quantitative determination of the hydrazone is made by reverse-phase high-pressure liquid chromatography using a UV detector operating at 336 nm. The lower limits of sensitivity of this method are 0.025 ppm for soil, 0.05 ppm for soybeans and soybean forage, and 0.25 ppm for soybean hay. Recoveries of FMC 25213 averaged 85% for soil, 96% for soybeans, 93% for soybean hay, and 86% for soybean forage. (Author abstract reprinted by permission of the American Chemical Society)

78-0691. Kanai, H. ; Wakatsuki, H.; Inouye, V. (Hawaii State Dep. Health, Chem. Sect., Lab. Branch, Honolulu, HI 96813) **Handling of volatile alkyl halides for infrared spectroscopy.** *J. Assoc. Off. Anal. Chem.* 61(1): 217-218; 1978. (4 references)

A technique is described for handling volatile alkyl halide unknowns for vapor phase infrared spectroscopy. The sample vial is broken and the liquid is transferred to a screw-capped vial. The vial is placed in a large bottle containing acetone and stored in a refrigerator. For IR analysis, the sample is transferred to the special assembly. (Author abstract by permission)

78-0692. Butler, L. C. ; Staiff, D. C. (Field Stud. Sec., U.S. Environ. Prot. Agency, Wenatchee, WA 98801) **Trace analysis of thiram by microcoulometry.** *J. Agric. Food Chem.* 26(1): 295-296; 1978. (7 references)

Thiram, a protective fungicide used in treating plants and seeds, is also used as an animal repellent to prevent damage to newly planted young evergreen seedling trees. This compound has been the cause of sporadic complaints of skin or respiratory tract irritation from exposed field workers. In conducting exposure studies of such workers there is need for analysis of many thiram samples. Existing analytical methodology for that compound is either of low sensitivity or involves lengthy laboratory procedures. Therefore, a rapid analytical method for thiram at the trace (low ppm) level was developed using total oxidation sulfur microcoulometry. The method involves a simple extraction, concentration, and a direct injection. Recovery and linearity are good. An application of the method involved analysis of field respirator pads collected from workers who had planted seedling trees and were therefore exposed to varying amounts of dust from the thiram formulation down to the trace level. (Author abstract reprinted by permission of the American Chemical Society)

78-0693. Cessna, A. J. ; Grover, R. (Herbic. Behavior Environ. Sect. Agric. Can., Res. Stn., Regina, Saskatchewan, Canada S4P 3A2) **Spectrophotometric determination of dissociation constants of selected acidic herbicides.** *J. Agric. Food Chem.* 26(1): 280-292; 1978. (26 references)

pKa values have been determined for ten acidic herbicides and one fungicide using a spectrophotometric method. pKa values are reported for [(4-chloro- *o*-tolyl)oxy acetic acid (MCPA), 3.13; (±)2-[(4-chloro-*o*-tolyl) oxy]propionic acid (mecoprop), 3.11; (2,4-dichlorophenoxy) acetic acid (2,-4-D), 2.87; 2-(2,4-dichlorophenoxy) propionic acid (dichlorprop), 2.86; (2,4,5-trichlorophenoxy) acetic acid (2,4,5-T), 2.85; 2-(2,4,5-trichlorophenyl) propionic acid (fenoprop), 2.83; 3,6-dichloro- *o*-anisic acid (dicamba), 1.90; 2-*sec*-butyl-4,6-dinitrophenol (dinoseb), 4.62; 4,6-dinitro- *o*-cresol (DNOC), 4.46; 3,5-dibromo-4- hydroxybenzonitrile (bromoxynil), 4.20; and pentachlorophenol (PCP), 4.71. The pKa values for (*o*-chlorophenoxy) acetic acid (2-CPA), 3.00, and (*p*-chlorophenoxy) acetic acid (4-CPA), 3.05, have been included for comparative purposes. The pKa values for 2-CPA, 4-CPA, MCPA, 2,4-D, and 2,4,5-T from this study were in close agreement with those previously reported from potentiometric and conductimetric determinations. The pKa values for 4-[(4-chloro-*o*-tolyl) oxy]butyric acid (MCPB), 4-(2,4-dichloro- phenyl) butyric acid (2,4-DB), 4-amino-3,5,6- trichloropicolinc acid (picloram), 3,6-dichloropicolinic acid (M-3723), and 2,3,5-triiodobenzoic acid (TIBA) could not be determined using the spectrophotometric method. (Author abstract reprinted by permission of the American Chemical Society)

78-0694. Miller, V. L. ; Csonka, E.; Gould, C. J. (Dep. Agric. Chem., W. Washington Res. and Extension Center, Washington State University, Puyallup, WA 98371) **Estimation of milligram and submilligram amounts of methylthiophanate fungicide.** *J. Assoc. Off. Anal. Chem.* 60(5): 1154-1156; 1977. (6 references)

A rapid procedure is described for measuring loss of methylthiophanate (MT) fungicide during treatment of flower bulbs. Samples containing MT in concentrations of 0.2 to 1.0 mg/ml are shaken with copper- triethanolamine- alkali reagent, after which the precipitate that forms is filtered, and pyridine- thiocyanate is reacted with the excess copper, which is measured by spectrophotometry or comparison with artificial standards. When the MT concentration is 0.002 to 0.1 mg/ml, spectrophotometry may be used to estimate the copper-MT compound directly, or a diethyldithiocarbamate procedure is used to determine excess copper. The procedure for the higher concentrations requires a pH of about 11.7; a pH over 12 caused low results. Neither soil, bulb scales, nor husk resulted in error in the results. Soluble iron salts and large amounts of ferric oxide caused interference. Unlike in-

terference caused by ferric oxide or manganese, cobalt, and nickel salts, interference caused by soluble iron salts can be controlled by sodium gluconate.

78-0695. Castillo, G. D. ; Jeffus, M. T.; Kenner, C. T. (Food Drug Admin., 3032 Bryan St., Dallas, TX 75204) **Gas-liquid chromatographic determination of chlordene epoxide in catfish.** *J. Assoc. Off. Anal. Chem.* 61(1): 1-4; 1978. (13 references)

Chlordene epoxide was detected in the range of 0.04 to 0.27 ppm in the edible portion of 3 catfish samples during the analysis of 36 fish samples by electron capture gas-liquid chromatography (GLC) for pesticide and industrial chemical residues. Two of these catfish samples were from suppliers in Louisiana and the third was from a Texas supplier. Chlordene was also present; the amount of chlordene epoxide in the 3 samples averaged 46% of the amount of chlordene present. The epoxide was identified by comparison of the mass spectra made the GLC retention times of the samples with reference material prepared in this laboratory. (Author abstract by permission)

78-0696. Dumas, T. (Agric. Can., Res. Inst., Univ. Sub P.O., London, Ontario, Canada N6A 5B7) **Modified gas chromatographic determination of phosphine.** *J. Assoc. Off. Anal. Chem.* 61(1): 5-7; 1978. (4 references)

A method was developed for determining residual phosphine (PH_3) at the ppt level; 10 cm x 3 mm id stainless steel tubing containing absorbent and cooled with Dry Ice was used to trap PH_3 from a stream of air. The trap which was adapted for use with a gas chromatographic (GC) system was then transferred to the gas chromatograph for direct analysis of the PH_3. Samples of wheat treated with PH_3 and exposed to air for several days were analyzed after 24-hr desorption and ppt quantities of PH_3 were found even after 17 days' aeration. Trapping PH_3 and the GC determination took less than 30 min, and the time for inserting the trap in the gas chromatoraph was about 10 sec. (Author abstract by permission)

78-0697. Stafford, C. J. ; Reichel, W. L.; Swineford, D. M.; Prouty, R. M.; Gay, M. L. (U.S. Fish Wildl. Serv., Patuxent Wildl. Res. Cent., Laurel, MD 20811) **Gas-liquid chromatographic determination of kepone in field-collected avian tissues and eggs.** *J. Assoc. Off. Anal. Chem.* 61(1): 8-14; 1978. (5 references)

A procedure is described for determining Kepone (chlordecone, decachlorooctahydro- 1,3,4-metheno- 2*H*-cyclobuta[cd] pentalene-2-one) residues in avian egg, liver, and tissue. Samples were extracted with benzene- isopropanol, and the extract was cleaned up with fuming H_2SO_4-concentrated H_2SO_4. Kepone was separated from organochlorine pesticides and polychlorinated biphenyls on a Florisil column and analyzed by electron capture gas-liquid chromatography (GLC). The average recovery from spiked tissues was 86%. The analyses performed on 14 bald eagle carcasses and livers, 3 bald eagle eggs, and 14 osprey eggs show measurable levels which indicated Kepone accumulates in the tissues of fish-eating birds. Residues were confirmed by GLC-mass spectrometry. (Author abstract by permission)

78-0698. Thean, J. E. ; Fong, W. G.; Lorenz, D. R.; Stephens, T. L. (Florida Dep. Agric. Consum. Serv., Div. Chem., Mayo Build., Tallahassee, FL 32304) **High pressure liquid chromatographic determination of methomyl and oxamyl on vegetable crops.** *J. Assoc. Off. Anal. Chem.* 61(1): 15-17; 1978. (2 references)

A reverse phase high pressure liquid chromatographic method is presented for the separation and determination of residues of the carbamates oxamyl and methomyl on vegetables. A liquid-liquid extraction and cleanup procedure is applied to the vegetable extract. Samples are eluted from a μBondapak C_{18} column and quantitated by ultraviolet absorbance at 240 nm. Recovery data for vegetable samples spiked at 2 ppm are presented. (Author abstract by permission)

78-0699. McLeod, H. A. ; Lewis, D. (Health Welfare Can., Food Res. Div., Bur. Chem. Safety, Food Direct., Ottawa, Ont., Canada K1A OL2) **Program for computation of response data from five different gas chromatograph detectors operating simultaneously.** *J. Assoc. Off. Anal. Chem.* 61(1): 18-25; 1978. (24 references)

A novel digital computer program for evaluating data from a gas chromatograph with 5 different detectors - electron capture, flame ionization, nitrogen, phosphorus, and sulfur - operating simultaneously is described. Detector signals are recorded on a 9-channel incremental tape, and then processed off-line by using a NOVA 8K computer system. Spurious signals from each detector are minimized by applying a simplified least squares smoothing procedure to the raw data points. Peak detection logic operating parameters may be varied for each detector. Relative retention times are calculated for 2 internal standards as references and peak areas are corrected for baseline drift. Operator interaction is maximal and several different data reporting formats are used to tabulate the raw and processed data. (Author abstract by permission)

78-0700. Yurawecz, M.; Roach, J. A. G. (Div. Chem. Technol., Food Drug Admin., Washington, DC 20204) **Gas-liquid chromatographic determination of chlorinated norbornene derivatives in fish.** *J. Assoc. Off. Anal. Chem.* 61(1): 26-31; 1978. (12 references)

1,2,3,4,7,7-Hexachloro- 2,5-norbornadiene (I), 1,2,-3,4,5-*endo*- 7,7-heptachloro- 2-norbornene (II), and 1,2,3,4,-7,7-hexachloro- 5,6-endo- epoxy-2-norbornene (III) have been identified as contaminants in Mississippi River fish by combined gas-liquid chromatography (GLC)-mass spectrometry. The method used to determine residues of these compounds, which are associated with production of the pes-

ticide endrin, is similar to the AOAC multiresidue method for chlorinated pesticides. The residues are extracted from the sample with acetonitrile, transferred to petroleum ether, and chromatographed on a Florisil column. Compounds I and II are eluted from the Florisil with petroleum ether and compound III is eluted with ethyl ether-petroleum ether (6+94). The concentrated eluates are analyzed by using electron capture GLC. The method provides adequate recoveries of all 3 chlorinated norbornene derivatives and allows quantitation at or below the 0.05 ppm level in fish with a 20 mg sample equivalent injection. (Author abstract by permission)

78-0701. Huckins, J. N. ; Stalling, D. L.; Smith, W. A. (U.S. Fish Wildl. Serv., Columbia Natl. Fish. Res. Lab., Columbia, MO 65201) **Foam-charcoal chromatography for analysis of polychlorinated dibenzo-dioxins in herbicide orange.** *J. Assoc. Off. Anal. Chem.* 61(1): 32-38; 1978. (17 references)

Herbicide Orange (OH) is a mixture of *n*-butyl esters of 2,4-dichlorophenoxyacetic acid (2,4-D) and 2,4,5-trichlorophenoxyacetic acid (2,4,5-T). The 2,4,5-T is known to contain 2,3,7,8-tetrachlorodibenzo -*p*- dioxin (2,3,7,8-TCDD) and other chlorinated aromatic contaminants. Adsorption of TCDD from and HO on small amounts of powdered charcoal results in sample cleanup adequate for electron capture gas-liquid chromatographic (GLC) analysis. Column flow restrictions with powdered charcoal are overcome by using polyurethane foams as a dispersive support. HO is dissolved in chlorform and percolated through a column suspended on clean polyurethane foam (14.9% charcoal/85.1% foam, w/w). Subsequently, the column is washed with benzene, and TCDD is recovered with toluene-benzene (1+1). Samples containing less than 1 μg TCDD/ml required additional sample cleanup on activated alumina prior to GLC analysis. The average recovery of TCDD determined from 4 replicate radiometric measurements was 91.4% (standard error = 4.0). TCDD residues greater than 0.02 μg/ml in HO samples were quantitated by electron capture GLC after cleanup. The presence of TCDD and pentachlorodibenzo -*p*- dioxin was confirmed by GLC-mass spectroscopy. In addition, tetrachloro- and pentachlorodibenzofurans were inferred by GLC-mass spectrometry. (Author abstract by permission)

78-0702. Cellerino, G. ; Re, M. (Lab. Ricereche Oxonitalia, 20016 Milan, Italy) **Gas-liquid chromatographic determination of pyridazinones in technical products and formulations.** *J. Assoc. Off. Anal. Chem.* 61(1): 161-163; 1978. (13 references)

Simultaneous determination of the active ingredient and of by-products in technical and formulated pyridazinones was rapidly performed by gas-liquid chromatography with complete resolution of all compounds. Quantitative determination by the internal standard technique is accurate and precise. The lower limit of detectability is 8×10^{-12} g/sec with a flame ionization detector and 1×10^{-12} g/sec with a nitrogen-phosphorus selective detector operating in the nitrogen mode. (Author abstract by permission)

78-0703. Martens, F. K. ; Martens, M. A.; Soylemozoglu, T.; Heyndrickx, A. M. (Lab. Med. Biochem., Sint-Niklaaskliniek, 8500 Kortrijk, Belgium) **Significance of rubidium bromide thermionic detector equipped with a gate electrode in the analysis of halogenated dicarbamate derivatives.** *J. Chromatog.* 140(1): 86-92; 1977. (6 references)

An attempt was made to establish a gas chromatographic (GC) detection method which could improve the identification of halogenated and non-halogenated dithiocarbamate benzyl esters. Solutions of DMeC12, DEtC12, DMeB, and DEtB in methanol with concentrations ranging from 5 to 2000 ng/microliter were spiked with 20 ng/microliter of azobenzene and 5000 ng/microliter of octadecane, which served simultaneously as internal standard and as an indicator for variations in the nitrogen flame-ionization detection (NFID) conditions. However, DMeF5 DEtF5 solutions were spiked only with 20 ng/microliter azobenzene, because of interference with octadecane. A research chromatograph equipped with a rubidium bromide NFID and a variable gate electrode potential was used. The term peak inversion was used to describe the gradual deformation of a chromatographic peak as a function of the applied voltage on the gate electrode. Each compound, depending on its heteroatom content, inverts at a different gate electrode potential. The ratio of the area of the azobenzene peak to the area of the octadecane peak indicated unexpected variations in the detector parameters. Attempts to assign each test compound a fixed specific inversion potential were unsuccessful, due to an inadequate accuracy of the voltage supply to the gate electrode. When all the compounds were injected simultaneously, it was possible to determine the exact sequence of inversion.

78-0704. Zatula, A. I. (All-Union Scientific Research Institute of Water Protection, USSR) **Opredelenie ostatochnykh kolichestv bazagrana v vode. [Determination of residual amounts of basagran (bentazon) in water.]** *Khim. Sel'sk. Khoz. Bashk.* 15(9): 54; 1977. (2 references) (Russian)

A gas-chromatographic method for the determination of basagran (bentazon; 3-isopropylbenz-2,1,3-thiadiazin-4-on-e 2,2-dioxide) in water is described. Following twofold extraction from acidulated water with diethyl ether, bentazon is methylated with dimethyl sulfate, and is determined on a gas chromatograph with a detector with constant rate of recombination, using Chromatone N-AW-DMCS with 5% silicon SE-30 in the column. The column, detector and evaporator temperatures are 230, 250 and 240°C, respectively. The lowest limit of quantitative determination is 10 μg/liter; the relative error is ±5%.

78-0705. Mitabe, M. ; Maruyama, Y.; Sakabe, Y. (Nagoya City Health Res. St., Nagoya, Aichi Prefecture, Japan) **[Studies on pesticide residues in foods (VIII). Analysis of the herbicides CNP, NIP and their degradation products in unpolished rice.]** *Nagoya Shiritsu Eisei Shikenjo Nenpo (Annu. Rep. Nagoya City Health Res. Sta.)* 23:33-35; 1976. (4 references) (Japanese)

A method determining residues of 2,4,6-trichloro-1-(4-nitrophenoxy) benzene (CNP), 2,4-dichloro- 1-4(nitrophenoxy) benzene (NIP), and their major degradation products (amino and acylamino derivatives) in unpolished rice grain by tansforming all of them into heptafluorobutylamido derivatives was studied. For the cleanup, partitioning into acetonitrile combined with column chromatography on a Florisil column was insufficient to remove the contaminants; however, each of the residues was detectable down to 0.005 ppm in the grain. As the gas chromatographic packing column a mixture containing 1.95% of GF-1 and 1.5% of OV-17 was found to be excellent; the peaks for CNP, NIP, and their heptafluorobutylamido derivatives were completely separated. The recovery of CNP and NIP was, on the average, 84.2 and 78.2%, respectively. After determination of the residues in 10 specimens of commercial unpolished rice grain in Nagoya City none of the residues was detected.

78-0706. Clear, M. H. ; Fowler, F. R.; Solly, S. R. B.; Ritchie, A. R. (Wallaceville Animal Res. Cent., Res. Div., Ministry of Agr. and Fisheries, Private Bag, Upper Hutt, New Zealand) **Detection of organophosphorus and carbamate pesticides in adipose tissue by thin-layer and gas-liquid chromatography.** *New Zealand J. Sci.* 20(2): 221-224; 1977. (11 references)

A residue screening method was established for a number of organophosphorus and carbamate pesticides used as animal remedies, agricultural chemicals, and for insect control in slaughterhouses. The method is based on a previously described extraction and partition procedure and incoporated a modified low-temperature clean-up technique. The clean-up is effected by hexane-acetonitrile partitioning and a novel freezing technique. Tentative identification of residues is made by thin-layer chromatography and confirmed using gas-liquid chromatograpy. Previously unrecorded *p*-values for eight pesticides are reported. The limit of detection for individual pesticides in adipose tissue is in the range of 0.001 to 0.2 mg/kg. Recoveries of 80% or greater are achieved.

78-0707. Sukhomlinova, G. K. (All-Union Inst. Exp. Vet. Med., USSR) **Vyyavlenie gardony v krovi, organakh i pomete kur. [Determination of gardona in the blood, organs and excrement of chickens.]** *Veterinariya (Moscow)* (7): 95-96; 1977. (Russian)

A thin-layer chromatographic method for the detection and quantitative determination of tetrachlorvinphos (gardona) in the blood, organs and excreta of chickens is described. The test compound is extracted with acetone from blood and with hexane from the organs and excreta, and reextracted with acetone. Chromatographic determination is done with a 98: 2 mixture of chloroform and acetone as the solvent system, using ammoniacal silver nitrate in acetone and UV irradiation for visualization. Tetrachlorvinphos appears on the chromatographic plate in the form of dark gray spots with Rf 0.53 ± 0.03 against a light gray background. The recovery rate is $82 \pm 10\%$, and the sensitivity is 0.1 mg/kg. Quantitative determination is done by visual comparison of the color intensity and spot size against a reference standard run on the same plate.

78-0708. Thielemann, H. (Hygiene-Inst., Martin-Luther-Univ. Halle-Wittenberg, DDR-402 Halle, DDR) **Eine einfache Methode zur Bestimmung von Gesamt-DDT (DDT + DDE) in Feten und Placenten unter Verwendung von Fertigfolien fur die Duennschichtchromatographie. [A simple method for determining total DDT in fetus and placenta using prepared TLC sheets.]** *Z. Gesamte Hyg.* 21(11): 879; 1977. (German)

A routine method for the semiquantitative determination of total DDT in fetus and placenta is described. Following hydrolysis with potassium hydroxide, extraction is done with hexane, and reextraction with ethanol. Using heptane as solvent, the sample is applied to a ready-made TLC sheet (Silufol UV 254). Ammoniacal silver nitrate solution is used for visualization under UV light.

78-0709. Thielemann, H. (Hygiene-Inst., Martin-Luther-Univ. Halle-Wittenberg, DDR-402 Halle, DDR.) **Experimentelle Untersuchungen zur semiquantitativen duennschichtchromatographischen Bestimmung von Parathionmethylruckstanden (Nach Reduktion zu *p*-Aminophenol) in Lebensmitteln. [Experimental studies on semiquantitative TLC determination of methyl parathion residues in food (after reduction to *p*-aminophenol).]** *Z. Gesamte Hyg. Ihre Grenzgeb.* 23(10): 789-790; 1977. (7 references) (German)

A method for the semiquantitative determination of methyl parathion in food is described. After extraction methyl parathion is subjected to alkaline hydrolysis, and reduced to *p*-aminophenol by treatment with 15% tin chloride solution and hydrochloric acid. The chromatographic plates are dried at 100°C and sprayed with a reagent for visualization and semiquantitative determination of *p*-aminophenol. Experiments revealed that ready-made sheets of UV 254 (Silpearl) and the stains Fast Red and Fast Black are best suited for the determination; the limits of detectability for the two different reagents are 0.06 and 0.08 μg, and the lowest limit of semiquantitative determination 0.4 μg.

78-0710. Begunov, G. A. ; Kocherovskaya, I. A. (Author address not given) **Gazokhromatograficheskii analiz ostatkov treflana i nitrofora v soevykh bobakh i semenakh khlopka. [Gas chromatographic analysis of treflan and nitrofor residues in soybeans and cotton seeds.]** *Zh. Anal. Khim.* 32(11): 227-2281; 1977. (22 references) (Russian)

Treflan (trifluralin) and nitrofor residues in soybeans and cotton were extracted with hexane, purified by distribution between acetonitrile and hexane, ultimately purified with Al_2O_3 on a column, and analyzed by gas chromatography. Electron capture detection was used with the gas chromatograph. Levels as small as 0.004 mg/kg can be detected after nearly absolute purification of the extract from oil residues when PEG-20M is used as the stationary phase.

78-0711. Thielemann, H. (Hyg. Inst., Martin-Luther-Univ. Halle-Wittenberg, 402 Halle, DDR) **Duennschichtchromatographische Identifizierung und Nachweisgrenzen von Pentachlorphenol. [TLC identification and detection limits of pentachlorophenol.]** *Z. Chem.* 17(7): 270; 1977. (German)

The detection and semiquantitative determination limits of pentachlorophenol were studied with different chromatographic layers and spray reagents. The solvent systems used were benzene and isopropanol/ammonia (90 + 10) for cellulose layers. The chromatographic layers used were Silufol UV 254 sheets, silica gel G according to Stahl (Merck), FND foil, and a mixed layer consisting of Silica gel G and Silpearl. The lowest detection limits were obtained with a mixture of potassium hexacyanoferrate (III) (1% in water) and iron(III)chloride (2% in water) (0.6 μg); methyl violet (0.05% in water) (0.8 μg); or diazotized sulfanilic acid (0.8 μg) on Silufol foil UV 254, silica gel G, or the mixed layer. The limit of semiquantitative determination was 4-8 μg.

78-0712. Klisenko, M. A. ; Pis'mennaya, M. V. (Author address not given.) **Khromatographicheskoe povedenie gerbitsidov gruppy fenilmocheviny i anilidov karbonovykh kislot.[Chromatographic behavior of phenylurea and carboxyanilide herbicides.]** *Z. Obshch. Khim.* 47(9): 2051-2051-2053; 1977. (4 references) (Russian)

The chromatographic behavior of 25 phenylurea- and carboxylic acid anilide-derived herbicides (fenuron, monuron, diuron, linuron, chlorbromuron, fluometuron, meturin, metobromuron, metoxuron, chloroxuron, propanil, solan, Tendex, *N*-(3-chloro -4- methylphenyl)propionamide, *N*-(3,-4-dimethylphenyl)propionamide, *N*-(4-methylphenyl) propionamide, *N*-(4-methoxyphenyl)- propionamide, *N*-(3-methoxyphenyl) propionamide, *N*-(3-trifluoromethylphenyl) propionamide, propachlor, SR-52223 and alachlor) was studied on alumina and silica gel layers. A 1 : 1 ratio mixture of carbon tetrachloride and ethyl ether was used as the solvent system and 1-naphthol as the visualizing reagent. The mobility of the compounds on the chromatogram was found to be determined by their specific interaction with the active centers on the sorbent surface and the electron shifts, caused mainly by the substituents at the carbon atom of the carboxyl group. The substitution of the methyl group at the nitrogen atom of phenylurea with a methoxyl group led to increased mobility, i.e., the mobility is also influenced by the steric hindrance caused by the substituents at the nitrogen atom of the amino group.

See also **78-0514** **78-0531** **78-0533** **78-0606** **78-0653**

PESTICIDES ABSTRACTS

QUARTERLY INDEX

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PREFACE

The basic design for this index was supplied by the Technical Services Division, Office of Pesticide Programs, Environmental Protection Agency. It consists of two subject indexes (concept and compound) and two author indexes (personal and corporate). Primary and secondary headings in the Concept Index appear as subordinate headings in the Compound Index, both indexes having three levels of specificity.

In the Concept Index, only general aspects are indexed under the broader terms shown below. For specific terms, the reader should consult the appropriate heading in the Concept Index, selecting the narrower term that best fits his need.

Compounds are indexed by their common names; where other compound designations are used by authors, these synonyms appear with the notation to *see* the common name. Articles referring, in general, to structural or functional chemical classes are indexed under the broader headings (e.g., organochlorines, herbicides, etc.).

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